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COMMUNITY RESPONSES TO SITING A HAZARDOUS WASTE  
FACILITY: THE CASE OF THE HIGH-LEVEL NUCLEAR  
WASTE FACILITY AT YUCCA MOUNTAIN, NEVADA

by

Lori A. Cramer

A dissertation submitted in partial fulfillment  
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Sociology

UTAH STATE UNIVERSITY  
Logan, Utah

1993

## ACKNOWLEDGMENTS

This research was supported in part by a research contract with Coopers and Lybrand Inc. (formerly Mountain West Research) for the Nevada Nuclear Waste Projects Office. Additional support was provided by the Utah Agricultural Experiment Station.

I would like to extend my appreciation to my committee members for their patience and commitment to this project. My gratitude is given to Dr. Gary Madsen and Dr. David Rogers for their insightful comments, and to Dr. Joanna Endter-Wada for her encouragement and thorough review of the manuscript. My appreciation also goes to Dr. Ronald Little for his critical reviews of and contributions to this dissertation, and especially for his availability during the final stretch of this project. Finally, a thank you is extended to Dr. Richard Krannich for his guidance and support on this project, and for the many professional opportunities and "learning experiences" made available to me.

In addition to my committee, I have received much support throughout my tenure at USU from other faculty members. Thank you for seeing me through my graduate training and providing me with the skills necessary for a career in sociology. A special note of gratitude is extended to the support staff of the sociology department for their ability to laugh at the world around them.

I need to extend my indebtedness to my fellow graduate students, both past and present, for their laughter, inspiration, and support. The lake days, Friday afternoons, coffee breaks, and all the time in between will always be remembered. Thank you for being there. Know that we will always be an E-mail away.

A heartfelt thank you goes to my "dinghy" friends for their unconditional support and confidence. I wish them luck on whatever road trips they undertake, and I hope they continue to make their own rules. In particular, a special thanks goes to Rhonda for her understanding, patience, and her invaluable assistance in completing my degree. I'm counting on her help on many more projects in the future.

Finally, I wish to express my thanks to my family for their patience and support. They can now tell their friends and neighbors that I have finally finished!

Lori A. Cramer



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## ABSTRACT

Community Responses to Siting a Hazardous Waste  
Facility: The Case of the High-Level Nuclear  
Waste Facility at Yucca Mountain, Nevada

by

Lori A. Cramer, Doctor of Philosophy

Utah State University, 1993

Major Professor: Dr. Ronald L. Little  
Department: Sociology

Quality of life is an important issue for residents facing potential changes in their social and/or physical environments. Potential quality of life changes are especially relevant for rural residents of southern Nevada who are currently facing the possibility of living near the nation's first high-level nuclear waste repository. Whether the effects of the proposed repository are perceived as positive or negative, they nonetheless alter residents' perceptions of their quality of life.

A theoretical model was designed to guide the analyses in this study. It suggested that residents have both current perceptions and future expectations for themselves and their community. When a proposed facility is introduced into the area, residents are forced to evaluate their future expectations in light of the new information

about the proposed project. Based upon their new evaluation, residents will either support/oppose a proposed facility.

From this theory sketch, eleven hypotheses regarding the relationship between quality of life and support/opposition for the proposed Yucca Mountain facility are derived. Using survey and ethnographic information obtained from rural Nevada residents, these hypotheses are examined.

The results indicate that although residents from all of the study communities are generally satisfied with their quality of life, they differ on both the types of anticipated repository-induced effects and whether they support or oppose the proposed repository. A relative absence of predictive power by quality of life measures, when taken in isolation from other variables, was unexpected. For all study communities, anticipated changes from the proposed project emerged as strong predictors of support/opposition, much stronger than the quality of life variables.

(243 pages)



## CHAPTER I

### INTRODUCTION

The introduction of any large-scale project to an area or the elimination of an existing project affects the quality of life of area residents (Finsterbusch 1980; Murdock and Schriner 1978). Changes may be viewed as detrimental to, or enhancing, an individual's overall quality of life. Furthermore, the decision to actively support or oppose a proposed project may well hinge upon the anticipation of changes in quality of life. Thus, quality of life becomes an important issue for residents facing potential changes in their social and/or physical environments (Hughey and Bardo 1987).

Potential quality of life changes are especially relevant for rural residents of southern Nevada who are currently facing the possibility of living near the nation's first high-level nuclear waste repository. While the 1982 Nuclear Waste Policy Act (NWPA) mandated the construction of a high-level nuclear waste facility, the 1987 Amendments limited site characterization<sup>1</sup> studies to Yucca Mountain in southern Nevada. In effect, the Amendments designated Yucca Mountain as the only site.

Unfortunately, the potential social consequences of siting the proposed Yucca Mountain facility are

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<sup>1</sup>Characterization refers to assessing the feasibility (e.g., rock stability, hydrology, etc.) of a potential repository site.

scientifically indeterminate at the moment. After all, no long-term hazardous waste storage facility has ever been built, and expectations for its consequences must be extrapolated from other research contexts.<sup>2</sup>

The past two decades have witnessed an increase in social science research on residents' opinions toward their community and their quality of life (e.g., Baldassare 1986; Campbell et al. 1976; Herting and Guest 1985; Hughey and Bardo 1987; Lewis and Lyon 1986; St. John et al. 1986). Thus, there is an empirical base which can be used to anticipate the consequences and suggest means for measuring quality of life resulting from projects like Yucca Mountain.

Although research on quality of life issues has increased, there is no consensus over the definition and measurement of quality of life (see Fusi 1989, Rogerson et al. 1987, 1989; Taylor 1987). Yet, there is a general agreement regarding two aspects of the concept. First, quality of life is a multidimensional construct related to the subjective level of satisfaction with one's way of life (Cutter 1985; Lewis and Lyon 1986); and second, the factors contributing to overall quality of life vary among human beings, over time, and from place to place (Taylor 1987;

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<sup>2</sup>The problem is compounded by the fact that theory development in the area of social impact assessment has lagged far behind empirical activity.

Hughey and Bardo 1987). Thus, community context<sup>3</sup> becomes an important determinant of quality of life.

Not only are quality of life issues important to examine, but as Murdock et al. (1983:2) have pointed out, "social science issues (broadly defined) may be as, or even more, critical than technical concerns in the development of successful high-level nuclear waste management and repository siting policies." Recognizing the importance of understanding the social impacts associated with the proposed repository, the Department of Energy (DOE) commissioned the National Research Council to study the potential socioeconomic impacts of a high-level nuclear waste repository.

In their 1984 report, *Social and Economic Aspects of Radioactive Waste Disposal*, the National Research Council identified several areas where research was lacking. Of particular interest to this study was their finding that quality of life issues lacked extensive investigation. They noted that

social values (e.g., equity, quality of life) [emphasis added] should be described in ways that allow the public to judge the degree to which the waste program realizes or fails to realize them. (National Academy of Sciences 1984:4)

Since this report, much research has been done on various socioeconomic aspects of the proposed repository

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<sup>3</sup>Community context refers to the social and physical conditions under which residents play out their lives.

(e.g., Berghausen et al. 1990; Broad 1990; Brody and Fleishman 1987; Carter 1987; Downey 1985; Finsterbusch 1988; Greenberger 1991; Hadden 1991; Heiman 1990; Krannich and Little 1988, 1989; Kunreuther et al. 1990; Peele and Ellis 1987; Slovic et al. 1991; White et al. 1990).

However, little research exists *specifically* addressing quality of life issues and their saliency in accepting or rejecting the proposed repository.

Not only has quality of life lacked extensive empirical investigation by social scientists, but the proposed repository allows researchers to look at quality of life in a distinctive research setting involving nuclear waste issues.<sup>4</sup> This unusual research setting suggests a need to move beyond examining standard types of effects related to other kinds of industrial projects and evaluate additional health and safety concerns. The proposed Yucca Mountain repository thus offers an interesting and unique setting to examine quality of life issues.

#### *Statement of the problem and purpose of the study*

The specific issues addressed in this dissertation are  
(1) to predict how people respond to a proposed project;

---

<sup>4</sup>Several researchers have suggested that the fact that the repository project is nuclear elicits unusual levels of concern by people, primarily due to the perceived risks associated with hazardous and nuclear projects (see Erikson 1990; Halstead and Leistritz 1983; Murdock et al. 1983; Slovic et al. 1991).

and (2) to explain why they respond the way they do. To address these issues, the following will be assessed: (1) perceptions of current and future quality of life; (2) anticipated impacts associated with the proposed high-level nuclear waste repository at Yucca Mountain, Nevada; and (3) resident's willingness to support/oppose the proposed repository. To date, there is little empirical or theoretical evidence on the relationship between quality of life issues and residents' decisions to support/oppose a proposed facility.

Unfortunately, no explicit formal theory is available to guide this research. In order to organize the research results presented here, a theory sketch<sup>5</sup> is presented. This theory sketch is based on perspectives, paradigms, and worldviews readily available in the literature of rural and environmental sociology. According to this theory sketch, residents have both current perceptions and future expectations for themselves and their community. When a proposed facility is introduced into the area, residents are forced to evaluate their future expectations in light of the new information about the proposed project. Based upon their new evaluation, residents will either

---

<sup>5</sup>A theory sketch differs from a formal theory in two ways. First, while the statements appear to be deductively related, the demonstration via deductive logic is missing. Second, the statements lack adequate empirical verification (Little 1993).

support/oppose a proposed facility.

From this theory sketch, eleven hypotheses regarding the relationship between quality of life and support/opposition for the proposed Yucca Mountain facility are obtained. Using survey and ethnographic information obtained from rural Nevada residents, these hypotheses will be empirically examined.<sup>6</sup>

The results from this analysis will contribute to our understanding of residents' perceptions of quality of life issues in two important ways. First, the results will give us information about the saliency of quality of life issues, and anticipated changes before project construction and operation. This is in contrast to the majority of existing studies which focus on perceived and actual changes after construction and/or operation of a project has begun. Not only will the saliency of quality of life issues be assessed prior to construction and operation of the project, but the results will provide important insights into the role these issues have in residents' decisions to support/oppose the proposed project.

The second important contribution of this study is the investigation of quality of life issues and potential impacts from a unique project never before proposed (i.e.,

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<sup>6</sup>The data are only a small part of the broader social impact assessment conducted by the Nevada Nuclear Waste Projects Office.

the high-level nuclear waste repository). Given the magnitude and scope of the proposed Yucca Mountain facility, it is likely that resident's perceptions are unlike those associated with the siting of most other industrial or governmental projects.



## CHAPTER II

### REVIEW OF THE LITERATURE

As noted in the last chapter, this study examines: (1) perceptions of current and future quality of life; (2) anticipated consequences from a proposed action; and (3) support/opposition to such a proposed action. The proposed action in this instance is the high-level nuclear waste repository at Yucca Mountain. No hazardous waste storage facility of the magnitude proposed for Yucca Mountain has ever been built. Without previous research on equivalent projects, impacts must be inferred from literature on the siting of other large-scale and/or hazardous waste facilities (National Academy of Sciences 1984). To adequately address the research issues, two separate bodies of research literature must be reviewed and evaluated: (1) the quality of life literature; and (2) the facility siting literature. The final section of this chapter will summarize the key findings and point to gaps in the available literature.

#### *Related quality of life research*

In the past, facility siting and quality of life research issues in rural areas have generally taken two directions. The first has addressed quality of life factors important to developers and their employees who migrate to the area. The second has been boom town studies



assessing the impact of projects on existing residents' quality of life. The former studies, which focus on corporate decisions to locate facilities, tend to evaluate the basic community amenities that would enhance the quality of life of their employees (Fusi 1989; Lyne 1988; Taylor 1987). Many facility planners view quality of life factors as essential in ". . . overall corporate strategy, appreciably aiding in recruitment, retention, productivity, morale and increasing the residual value of a facility" (Lyne 1988:868). However, few corporate studies look at the potential impacts of quality of life on existent residents.

The second type of study focuses specifically on quality of life issues in rural areas. Some have examined the potential changes resulting from rapid population growth, e.g., boom towns (Brown et al. 1989; Cortese and Jones 1977; Greider and Little 1988; Krannich and Greider 1984; Little 1977). Boom towns<sup>7</sup> in the western United States are typically rural, sparsely populated areas, which experience extremely rapid population growth as a result of large-scale energy resource projects. Interest in and research on the social impacts of boom towns emerged in the mid 1970s (Gilmore and Duff 1975; Gold 1974; Kohrs 1974).

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<sup>7</sup>There exists no explicit definition of boom towns in terms of population or economic growth. Thus, towns referred to as boom towns differ widely on a variety of crucial variables.

Results from these early studies indicated numerous adverse social consequences accompanied rapid growth in boom towns, such as increases in divorce and depression (Kohrs 1974), sense of powerlessness (Gold 1974), and deteriorating quality of life (Gilmore and Duff 1975).

Subsequent research questioned some of the methodology and interpretations leading to conclusions about the necessarily negative consequences of boom towns (Krannich and Greider 1984; Wilkinson et al. 1982). More recently, Krannich and Cramer (1993:162) have noted that

. . . while many questions remain unanswered, the cumulative evidence suggests that, while disruption may not be as serious or as widespread as initially reported, at least some dimensions of well-being do deteriorate for many if not most boom town residents.

Furthermore, evidence indicates the effects of boom towns will not be borne equally by all residents (see Elkind-Savatsky 1986). For instance, should the community experience economic inflation, and most do, residents on fixed incomes (also single mothers) may experience negative shifts in economic well-being, whereas other residents may experience positive shifts in economic well-being (Krannich and Cramer 1993; see also Krannich and Greider 1990).

#### *Community satisfaction*

In addition to experiencing differential effects, residents are also likely to vary on how they perceive their quality of life will be affected by community change.

In the boom town literature such perceptions have been assessed by measuring resident's community satisfaction and community attachment (e.g., Brown 1988).

Within the boom town literature, overall satisfaction and satisfaction with available community services, i.e., infrastructure, have all-too-often been the primary focus (Greider and Krannich 1985; Murdock and Leistritz 1979). Within the boom town literature, quality of life *per se* lacks comprehensive empirical and formal theoretical investigation. This is due, in part, to a lack of consensus among researchers as to what constitutes quality of life. Although there is an absence of an agreed-upon definition of quality of life, in boom town (and other) studies, various individual and community satisfaction variables have been used as indicators of quality of life. For example, overall satisfaction has been measured directly (e.g., "how satisfied are you with your quality of life"; or "how satisfied are you with your community") (e.g., Bourke 1991). Other researchers have asked a series of questions designed to assess specific dimensions of satisfaction (e.g., available community services, environmental aspects of the area, available economic opportunities, etc.) (e.g., Murdock and Leistritz 1979).

Unfortunately, studies on satisfaction variables have revealed indeterminate results. For example, Brown et al. (1989:571) note that ". . . the existing literature does

not provide conclusive evidence about the effects of rapid growth in rural communities, at least with respect to community satisfaction and social integration" (1989:571).<sup>8</sup> Brown et al. suggest a lack of knowledge by researchers about preboom town conditions may hinder an understanding of the perceived impacts. Their longitudinal analysis ". . . revealed levels of community satisfaction, attachment, and social integration deteriorated between preboom conditions and various phases of rapid change" (Brown et al. 1989:580). These findings may be due, in part, to residents' anticipation of disruptions (see Albrecht and Thompson 1988; Gramling and Freudenburg 1992; Wilkinson et al. 1982).<sup>9</sup> It may be the case that the mere announcement of a proposal for a new project may induce changes in perceptions by residents as to their quality of life. These studies illustrate the importance of understanding residents' perceptions prior to construction and operation of new projects.

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<sup>8</sup>It should be noted that Delta, Utah, the community under investigation, experienced far less rapid growth than more well-known communities, such as Rock Springs, Gillette or Evanston, Wyoming. Furthermore, planning insulated the community from many of the more difficult problems typically associated with rapid growth.

<sup>9</sup>Even if this were the case, it does not invalidate the assertion of causal effects attributable to a project. The effects are real.

### *Community attachment*

In addition to using satisfaction variables as indicators of quality of life, several studies suggest community attachment also plays a key role in residents' perceived quality of life (Fitchen 1989; Hughey and Bardo 1987). Guest and Lee (1983) suggest that attachment to and satisfaction with a community are distinct concepts composed of different variables. They argue that residents may be satisfied with their community, yet not necessarily feel an attachment to the area.

Community attachment has been a research interest for over a century. Two perspectives dominate the literature on community attachment: the linear development model and the systemic model. The linear model suggests resident's attachment to their community is negatively affected by increases in the size and density of the local population. The systemic model, on the other hand, suggests that the individual's location within the community's social structure is more salient to their community attachment than the size and density of the population.

The linear model is primarily based on the work of early urban sociologists (e.g., Durkheim 1893/1933; Toennies 1887; Wirth 1938). These earlier works suggested that increases in population size, density, and heterogeneity reduced feelings of community attachment. Thus, the linear model is so named "because linear

increases in the population size and density of human communities are assumed to be the primary exogenous factors influencing patterns of social behavior" (Kasarda and Janowitz 1974:328). The systemic model is far more recent and its most notable proponents are Kasarda and Janowitz (1974). This model incorporates length of residence, position in the social structure, and stage in the life cycle as key variables of community attachment. It also suggests that community attachment involves a subjective component.

To address the subjective component of community attachment, Kasarda and Janowitz used questions reflecting an individual's social bonds and local sentiments. Such questions include asking whether respondents feel at home in the community, and the proportion of friends residing in the community. They then attempted to test the linear and systemic models. Their results yielded more support for the systemic than the linear model, with length of residence emerging as the most important variable. This research suggests that length of time spent in the community enhances the development of social bonds to the area.

Subsequent research has supported the systemic model approach (e.g., Eliason 1992; England and Albrecht 1984; Gerson et al 1977; Goudy 1990; St. John et al. 1986; Sampson 1988). For instance, Goudy (1990) compares the



linear and systemic models, examining 27 rural communities. He hypothesized that community attachment as measured by the systemic model rather than the linear model would be more applicable in rural areas, with length of residence operating as the predominant variable in explaining attachment.<sup>10</sup>

Using questions addressing residents' social bonds and local sentiment (e.g., "do respondents feel at home in the community?"), Goudy found that residents of different communities have varying levels of community attachment. He notes that systemic measures more so than linear model measures explain residents' attachment to their community. Goudy (1990:196) concludes that "[a]lthough size and density [linear model measures] may be related to many aspects of mass society, other variables [systemic model measures, including subjective elements] generally are of greater importance when community attachment is considered."

### ***Facility siting literature***

The above discussion of boom towns and indicators of quality of life (community satisfaction and attachment) suggests that rural residents have existing levels of

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<sup>10</sup>The comparisons of the linear and systemic models reflect the problems associated with measuring internal states versus more quantitative measures (e.g., length of residence).

quality of life, which are likely to vary by community. Furthermore, these levels of quality of life are likely impacted by the changes accompanying the construction and operation of a new facility in the area. Beyond the boom town effects, the siting process itself may have important implications for residents' current and future quality of life. Furthermore, these potential effects may affect residents' support/opposition to the proposed facility. Therefore, a review of the facility siting literature is warranted.

Community residents vary on their reasons for supporting or opposing proposed facilities located nearby. The most oft-cited reason for opposing a project is the not-in-my-back-yard (NIMBY) explanation, which contains several causal variables (Edelstein 1988; Flynn et al. 1991; Gervers 1987; Greenberger 1991; Heiman 1990; Kaufman and Moorer 1991; Kraft and Clary 1989; Portney 1991). Unfortunately, NIMBY has been used as a catch-all phrase to describe any opposition to proposed facilities. At best NIMBY, as generally used, reflects an unwillingness to accept the perceived risks/hazards associated with the proximity to a new facility.

One common perceived risk identified in the literature is that residents near a proposed project may express their unwillingness to host a project on the basis of anticipated stigma to the area. This stigma may, in turn, affect



aspects of the local economy such as tourism or lower property values (Edelstein 1988; Gamble and Downing 1982; Hageman 1981; Kolhase 1991; Payne et al. 1987; Slovic et al. 1989). The potential effects on the economy are particularly salient issues to rural areas lacking economic stability.

Another commonly perceived risk includes potential health and safety risks (Kunreuther et al. 1988; Kunreuther et al. 1990). Such health and safety risks are particularly salient when the proposed project involves hazardous/nuclear materials (Slovic et al. 1989). Other perceived risks or concerns affecting project opposition are negative experiences with previous projects (Stoffle et al. 1988) and/or lack of trust in the agencies involved in the proposed project (Krannich and Little 1988, 1989; Yates 1990a, 1990b). That is, residents consider past experiences in formulating perceptions about current and future events.

Thus, the more common causes of opposition to a proposed project include: (1) perceived economic issues, (2) trust in agencies responsible, and (3) perceived health/safety risks. The following discussion elaborates on the literature pertaining to these areas.<sup>11</sup>

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<sup>11</sup>These sections are not mutually exclusive; nor do they represent the full range of possibilities. The divisions of the literature were selected because of their frequency of use in the literature and relevancy to the

*Perceived economic issues*

One of the factors identified as important to rural residents is perceived economic need (e.g., Bourke 1991). A primary target area for many facilities which are perceived as representing risks/hazards are rural, sparsely populated areas, which face economic hardship and which lack the political clout to keep such a facility out of their community (see Kaufman and Moorer 1991). However, rural residents frequently want, and even solicit such facilities. Often their rationale is the anticipation that the proposed project will boost the regional and/or local economy (Bailey et al. 1989; Bourke 1991; Krannich and Little 1988, 1989; Krannich and Luloff 1991; Molotch 1976; Sundstrom et al. 1977; Zeiss and Atwater 1987). The irony is that although many rural areas support new projects anticipating economic growth, studies suggest few residents actually receive the anticipated benefits (Clemente 1975; Little and Lovejoy 1979; Summers and Branch 1984).

Many rural areas have experienced poor economic conditions throughout the 1980s and this situation is likely to continue into the 1990s (Fitchen 1991). Often the employment available in an area does not adequately meet the needs of the residents. Because of this, rural communities are increasingly spending more time and energy seeking projects which will provide jobs, even if they have

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topics of this study.

consequences which under normal circumstances would be considered undesirable (e.g., prisons, hazardous waste facilities). When rural residents are faced with a proposed action such as a prison or hazardous waste facility, they are caught in a catch-22: the need for economic growth versus undesirable consequences for their community. Residents likely weigh the saliency of their current situation and the directions they want their community to go with the perceived consequence of the proposed facility. For many residents the saliency of economic stability may be the most important issue. Thus, regardless of the consequences, many residents feel compelled to support a project that under conditions of economic stability they might otherwise oppose.

Krannich and Luloff (1991) suggest such a catch-22 dilemma may represent a "bad deal." The bad deal alternative purports that support for locating a facility, which includes undesirable consequences by most standards, may be due to the perception that such a facility is the only alternative available (Krannich and Luloff 1991). In other words, a community that is struggling to survive economically or perceives a great need for economic growth will support a bad deal rather than have no deal.

A bad deal interpretation has been suggested for several resource dependent rural communities in the United States. For instance, many extractive industries (e.g.,

mining, timber) are in decline, and rural communities dependent upon them have faced times of economic hardship (Lee et al. 1990). Communities whose economic base has been primarily mining or timber harvesting have experienced economic decline through the 1980s as these resources have been depleted or become unprofitable (e.g., as a result of the Endangered Species Act, government restrictions, reduced availability of raw timber, etc). Residents in these communities now search for an alternative industry which will ensure economic survival.

As a result, many such communities are trying to attract new industries. Furthermore, recent evidence suggests that industries involved with hazardous materials are targeting rural areas to dispose of these materials (Krannich and Luloff 1991). Not only are many rural areas in a state of economic stagnation or decline, but in many cases they lack the ability to stop the location of unwanted facilities.

However, other studies indicate that even when economic issues are important, other issues (e.g., health/safety) may be more salient to area residents (Rocky Mountain Social Science 1992; Richards 1992). In a recent study looking at a proposed hazardous waste management facility, Richards (1992) found that rural residents perceived economic benefits as the primary result. Yet, these same rural residents felt the ". . .

environmental/health/safety and decision-making issues still override the economic concerns. . . [although]. . . the economic incentive [was] still in the minds of rural residents" (Richards 1992:94).

### *Trust/distrust*

In addition to the above concerns identified by rural residents, recent studies suggest trust of government agencies (local, regional, state and federal), business or any organization putting up a facility, is an important factor contributing to support/opposition for proposed projects (Krannich and Little 1988, 1989; Krannich et al. 1993; Stoffle et al. 1988). For instance, residents may take into account the legacy of trust/distrust associated with the federal government and related hazardous projects (e.g., Three Mile Island).

Furthermore, the way that projects are initially introduced and managed by various levels of government may exacerbate resident's lack of trust. For instance, in a study examining residents' opinions toward a proposed low level nuclear facility in Boyd County, Nebraska, Rocky Mountain Social Science (1992) found a great deal of distrust for local government officials and the commercial organization desiring to build the facility. Several residents indicated "back room politics" and bribery of local officials took place long before the formal announcement of the proposed facility (see Rocky Mountain

Social Science 1992).

In addition to considering the manner in which a proposed project is dealt with, residents take into account past experiences with similar projects. The response pattern (e.g., support/opposition based on comparisons residents make with past experiences and analogous projects) has been referred to as a "risk perception shadow" (Stoffle et al. 1988). According to Stoffle et al. (1988:6), a risk perception shadow is

a predisposition to distrust projects involving potentially adverse health or social impacts and to doubt agency or company statements regarding the potential dangers associated with these projects.

Results from their telephone survey and subsequent ethnographic interviews indicated that "previous projects [in the area] caused a lowering of public trust in agencies and companies and heightened public concern for projects involving harmful substances" (Stoffle et al. 1988:13). Such previous negative experiences may lead community members to reject subsequent projects. Thus, based on the "risk perception shadows" explanation, proposed projects may be rejected because of a distrust of government and/or project developers.

#### *Perceived health/safety risks*

Perceived health/safety risks also have been found to be of concern to residents facing proposed facilities. Recent studies reveal that perceived risks to individuals,



communities, the environment, and future generations can lead to opposition to a proposed project (Krannich and Little 1988, 1989; Richards 1992).

Health/safety risks are especially relevant in the case of siting the high-level nuclear waste repository in southern Nevada. The fact that the project is nuclear elicits unusual levels of concern by residents because of the risks associated with nuclear projects (Erikson 1990; Halstead and Leistritz 1983; National Academy of Sciences 1984; Slovic et al. 1979; Thomas et al. 1983). Murdock et al. (1983:9-10) point out that ". . . the special effects of a repository result from the fact that it is a facility handling radioactive materials which are perceived and thus reacted to in a manner quite different than those for other types of large-scale projects."

Recent research suggests the psychological, cultural, and aesthetic reactions resulting from projects involving radioactive materials increasingly have been found to be contributing factors in residents' opposition to siting hazardous and toxic facilities near their homes (Edelstein 1988, 1991; Flynn et al. 1991; Slovic et al. 1979). Slovic et al. (1991:685) suggest that nuclear waste ". . . stands out in studies of risk perception as unknown, uncontrollable, and dreaded, with the perceived potential to produce immense numbers of fatalities, even to future generations." Likewise, Halstead and Leistritz (1983:182)

note: "[O]ne of the major special effects that a nuclear waste repository may create is a feeling of *fear and anxiety* in the local community regarding possible accidents and long-term effects" (emphasis added).

In addition to concerns about accidents, residents in communities that oppose undesirable projects often indicate the potential risk of being stigmatized (both as individuals and as a community) should the proposed project be implemented.<sup>12</sup> Stigma is a multifaceted concept, and it tends to refer to an attribute ". . . that is deeply discrediting" (Goffman 1963:3). Stigma is also a symbolic reaction which can evoke responses to objects or events which may not be physically present.<sup>13</sup> Although Goffman discussed stigma in relation to individuals, it seems to be equally applicable to feelings toward communities. Just as individuals want to avoid being stigmatized, so to do residents want to avoid a stigma being placed on their community or state. Unfortunately, a place can be stigmatized before the actual event occurs. That is, the

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<sup>12</sup>Goffman (1963) referred to this as a "courtesy stigma," wherein one's identity is discredited by association. Similarly, Edelstein (1991:9) used the term "environmental stigma" to suggest that ". . . stigma may affect perceptions of the desirability, safety or attractiveness of settings that in turn affect people."

<sup>13</sup>Hazardous facilities are often located away from residents' view, and are thus perceived as a "phantom" project, with little actually being known or understood about the project (Little and Krannich 1990).



mere proposal to place a hazardous facility near one's community can result in a stigma being attached to the area and its residents (Edelstein 1991).

Typically, residents want their community and its residents to project a particular "image" to others, and they want the image to be positive. Thus, residents may perceive a proposed project as stigmatizing their state, community, and/or area residents in ways which may deter visitors (immigrants or businesses) from coming to the area (see Slovic et al. 1989).

### *Summary*

The existing literature on social change and quality of life in rural areas primarily emanated from research on boom towns in the western United States. Many boom town studies examined the impacts, both real and perceived, of projects proposed, built, or operated in rural areas. Although many of these early studies are flawed (e.g., they only look at one point in time, or examine impacts only after project completion), results from later studies suggest local residents experience some disruption to their quality of life (e.g., Brown et al. 1989). Furthermore, disruptions to their quality of life can occur before the construction of the proposed facility.

The problem of over-time measures was not solved in this study, which also measures respondents at only one point in time. Nevertheless, it can contribute to our

knowledge of pre-project conditions insofar as it examined perceptions prior to the construction of the facility.

An additional gap in the previous studies is the role of perceived impacts to quality of life in residents' decisions to support or oppose a project. That is, what needs further elaboration is how perceived quality of life consequences affect residents' decision making prior to the construction and operation of a facility. This study will shed light in this neglected area.

Studies on quality of life indicate that individual and community satisfaction levels are important to residents facing potential impacts from a proposed project. Furthermore, such quality of life issues are likely to vary across communities. To understand the differences across communities, it is important to have an awareness of the community context. Community economic stability and perceived economic need are aspects of community satisfaction that play key roles in residents' views of proposed projects and their willingness to support/oppose such projects (Little and Lovejoy 1979). That is, economic issues tend to be salient concerns. For residents who perceive economic stability to be the most important concern, they may accept what to others may appear a "bad deal," as suggested by Krannich and Luloff (1991). Or residents may respond as suggested by Murdock and Leistritz (1983:183): "[T]he prospects of possible environmental and

health damages, noxious odors, and unsightly areas seem to far outweigh any anticipated economic benefits."

In addition to community satisfaction, community attachment has been shown to be an important indicator of residents' overall quality of life. Two models (linear and systemic) of community attachment are common in the literature. However, more recent studies suggest the factors included in the systemic model (e.g., length of residence and local bonds and sentiments) are more important indicators of community attachment. This latter interpretation suggests the importance of considering internal states, rather than only quantitative or objective measures, such as community size and density.

The literature on facility siting in rural areas identifies several topics of concern to area residents: economics, trust in government, perceived risks (e.g., stigma, health/safety issues). Such concerns may be exacerbated when the proposed facility involves toxic or hazardous materials. Furthermore, the perceptions of residents living near the proposed project become very important, not only in assessing perceived impacts, but also in their receptiveness to the facility. All of this suggests that a better understanding of residents' concerns and fears is necessary in order to anticipate responses.

Results from the facility siting literature also suggest that salient issues are likely to vary across communities. Furthermore, the saliency of individual and

community issues likely is influenced by their social and physical environments. Therefore, to meaningfully interpret the concerns of local residents, it is necessary to take into account the community context.

### CHAPTER III

#### THEORETICAL AND CONCEPTUAL ORIENTATION

Throughout history, rural communities, to varying degrees, have been affected by socioeconomic changes. Westward expansion in the United States witnessed a myriad of social changes in rural areas as ". . . people struggled to settle and harness the land" (Field and Burch 1988:6). Early communities established around agriculture and mining faced problems of drought, deforestation, soil infertility, erosion, mineral depletion, and other environmental problems.

Similarly, rural communities have historically experienced socioeconomic changes resulting from industrial and technological growth or decline. For example, the adoption and diffusion of new farming equipment and agricultural practices led to profound changes. A classic problem created by technological change involved the transfer of a railroad from steam to diesel-electric power (Cotrell 1951). This change led to difficult employment adjustments for railroad employees as well as area residents dependent on the railroad. These and many other changes have had significant impacts on rural communities.

Trying to understand and predict how rural communities respond to social change has been an issue of concern to social scientists for nearly a century (Field and Burch 1988). Traditionally, when rural areas have been faced

with social change resulting from the introduction of new technologies, economic factors have been the primary focus of scientific investigation. Today, it is generally accepted by social scientists that there are many non-economic arenas of change that must be considered in order to gain a more complete understanding of the potential social impacts implied by change. This need to understand the noneconomic effects resulting from exogenous social change has led to the development of the field of social impact assessment.

The social impact assessment process is generally recognized as a consequence of passage of the National Environmental Policy Act of 1969 (NEPA). NEPA formally required Federal agencies considering major actions that involve public lands to identify not only the potential impacts to the natural environment, but also to the social environment as well. Prior to NEPA, there was no legal obligation for those proposing a project involving federal lands to either consider or mitigate potential social impacts.

Although NEPA specifically applies to projects utilizing public lands, similar legislation has emerged to govern agencies at the state level. By extension, many private businesses and groups interested in utilizing public resources have also incorporated some form of physical and social impact assessment into their formal

planning and decision-making processes (Branch et al. 1984).

Social impact assessments (SIAs) have provided many insights into understanding community responses to a wide variety of proposed actions. The insights gained from early social impact assessments include information about constraints and problems communities faced as a result of rapid population growth accompanying the construction of large-scale projects (e.g., increased fear of crime (Freudenburg 1986); potential community conflicts between supporters and opponents (Gold 1974); reduced levels of perceived social integration (Greider and Krannich 1985); and dissatisfaction with local services (England and Albrecht 1984)).

Unfortunately, theoretical developments, in the form of deductively interrelated statements, have lagged far behind the generation of empirical findings (Little and Krannich 1989).<sup>14</sup> Among the problems associated with theory development in social impact assessment, as well as the study of community change, is that there is such a wide range of phenomena to be considered. Examples of such phenomena include: potential economic benefits/harms from

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<sup>14</sup>An absence of a guiding theory is not unique to SIAs, ". . . [F]ew, if any, social science theories can match the requirements of a narrow definition of a scientific theory: *A set of logically interrelated statements that are isomorphic with some finite set of phenomena*" (Little and Krannich 1989:24).



a proposed activity; physical growth of the community and the need for more housing; a lost sense of community; fear for physical safety; and the immigration of new, possibly very different types of people which can lead to social and political conflict.

Each phenomenon may require the examination of numerous factors: social structural<sup>15</sup>, social psychological, economic, technological, and/or some combination of the above. Depending upon the research focus, several different, and probably noncompeting theories could emerge from any social impact assessment. Thus, this absence of formal theory development is not surprising.

The theoretical issue of concern in this effort is to link potential community structural changes to individual perceptions and social psychological responses. For example, it is unclear as to the extent physical changes (e.g., construction of a large-scale project) are likely to lead to community structural changes (e.g., changes in how formal decisions are made). In turn, these structural changes may affect both perceptions of one's self and community, which in their turn impact public responses to new facilities.

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<sup>15</sup>The social structural context refers to the patterned ways in which people respond to and interact with their environment, including formal organizations and informal social networks.



The link between community structural changes and individual perceptions has been especially problematic in the field of social impact assessment because researchers are often forced to ask respondents their opinions about a proposed action, rather than examining their actual behaviors (e.g., voting). Researchers thus must examine behavioral intentions<sup>16</sup> rather than actual behavior. Social impact assessments are conducted prior to project construction and operation, thus, potential impacts are interpreted as anticipated changes rather than actual changes.

As a result of the lack of rigorous theory development accompanying social impact assessments, the social sciences have all-too-frequently relied upon the use of worldviews, perspectives, or paradigms to direct empirical analyses (cf. Humphrey and Buttel 1982). Unfortunately, such orientations offer few obvious or necessary clues to guide the concrete investigation of the relationship between community structural changes and individual perceptions. Quality of life is one area of perceptions that has received relatively little theoretical attention. Such is the case even though the relationship between perceived quality of life and public responses to a proposed action

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<sup>16</sup>Lounsbury et al. (1983:217) use the concept of *behavioral intention* to ". . . represent a person's intention to perform a behavior, or likely course of action an individual might take with respect to an object."

is an important theoretical and empirical consideration.

Quality of life, as used here, refers to individual perceptions of both self and community well-being. As such, perceptions of quality of life likely will vary over time, from community to community, and among individuals.<sup>17</sup> The concept of quality of life includes perceptions of psychological, sociological, economic, and physical environmental phenomena. Thus, a comprehensive understanding of perceived changes in quality of life resulting from a proposed action must draw from a variety of existing theoretical orientations, primarily community and rural sociology.

In an attempt to encourage theoretical development, as well as offer guidance to anticipating potential changes in residents' living environments, Little and Krannich (1989) offer a framework for assessing the social impacts of large-scale projects. The model consists of four interrelated components: (1) values; (2) community structures (e.g., economic, political, formal social, and informal social); (3) community activities and processes (e.g., socialization, social control, participation and mutual support); and (4) social well-being. The model attempts to provide an extensive list of potentially

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<sup>17</sup>Frequently, quality of life has also included more objective indicators (e.g., crime rates and demographic shifts). For the purposes of this study, only the subjective issues will be examined.

important concepts in the assessment of impacts, beginning with the more abstract (values), and ending with the most concrete (quality of life). However, the authors note that

the bottom line in assessing the significance of project-induced alterations of community social organizations and processes is the degree to which such alterations will result in impacts on the social well-being and quality of life experienced by residents of affected communities. (Little and Krannich 1989:28)

Therefore, it is important to understand how the various dimensions of potential impacts are integrally linked to the existing value systems characterizing groups and organizations within communities (Little and Krannich 1989; Wilkinson 1991). Knowledge of local values implies that the community context and history are known and understood.

Of interest to this study is the relationship between perceived quality of life and support or opposition to a proposed activity. Here it is argued that knowledge of salient information (e.g., attitudes, perceptions, beliefs) enables researchers to better predict residents' responses to social change. For example, residents who on an abstract level place a high priority on economic and population growth are likely to respond favorably to employment opportunities and anticipated population increases associated with a proposed project. As a result, they would experience increased levels of satisfaction. Conversely, those residents exhibiting anti-growth sentiments would likely experience a deterioration in

levels of perceived satisfaction (Little and Krannich 1989).

Wilkinson argues that personal and social well-being ". . . encourages actions that also protect ecological well-being" (Wilkinson 1991:79),<sup>18</sup> thus linking the social and physical worlds. He suggests the following hypothesis related to community development and the importance residents place on the protection of the natural environment: ". . . [C]ommunity development . . . reduces the probability of occurrence of actions that degrade ecological well-being" (Wilkinson 1991:79).<sup>19</sup> In other words, residents interested in community well-being are unlikely to support new actions that are perceived to negatively affect the quality of their physical and social environments and their ability to interact. This framework reinforces the importance of quality of life as an important area of investigation.

### *Theoretical approach*

This study not only empirically investigates the

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<sup>18</sup>"[E]cological well-being . . . refers explicitly to natural and other conditions that support human life" (Wilkinson 1991:75).

<sup>19</sup>Wilkinson (1991:87-88) refers to community development "as a process of developing the community field. . . . The community field . . . represents the capacity of local residents to work together for their own well-being, and community development builds that capacity."

various aspects of quality of life, as suggested by Little and Krannich (1989) and many others (e.g., Branch et al. 1984; Filson and McCoy 1993; Finsterbusch et al. 1983), but it also extends the investigation to include the relationship of perceived quality of life to residents' decisions to support or oppose a proposed action.<sup>20</sup> Branch et al. (1984) stress the importance of assessing perceptions of area residents toward potential changes in the community as well as their perceptions of personal well-being when the proposed action is implemented. The assessment of this relationship ". . . requires the application of information about current attitudes, perceptions and anticipations of future conditions" (Branch et al. 1984:163).

### *Theory sketch*

As previously noted, there is an unfortunate absence of formal theory to guide the empirical investigation of an actor's perceptions and their consequences. In the absence of formal theory, a theory sketch has been created to organize and interpret the data.<sup>21</sup>

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<sup>20</sup>In the qualitative research literature, this is referred to as an emic phenomena. The actor's characterizations of the world are used to explain his/her behavior (see Agar 1986:44).

<sup>21</sup>A theory sketch differs from a formal theory in two ways. First, while the statements appear to be deductively related, the demonstration via deductive logic is missing. Second, the statements lack adequate empirical verification

Figure 1 provides a graphic model of the theory sketch guiding this study. Conceptually, the theory sketch begins with two factors, the (1) social and (2) physical environments. These two environments have a shared history, and exist prior to the proposed project. Together they shape current perceptions of individual and community life. In turn, perceptions of individual and community life will affect the aspirations and goals residents have for their future community. For instance, if the current economy in the community is perceived as unstable or declining, residents will likely desire to see the community achieve a stable economy in the future. These are the component elements of the constantly evolving social system.

When an exogenous factor such as a proposal for some facility or organization (e.g., power plant, hazardous waste incinerator, prison) is advanced, the ongoing social system is forced to adjust. Individual and community changes will generally be anticipated by local residents. Aspirations for their future community and individual well-being will be examined by residents to determine their consonance with the change likely induced by the proposed action. That is, aspirations for the future interact with knowledge of and beliefs about the proposed action (e.g., hearsay, published reports, newspaper articles, personal

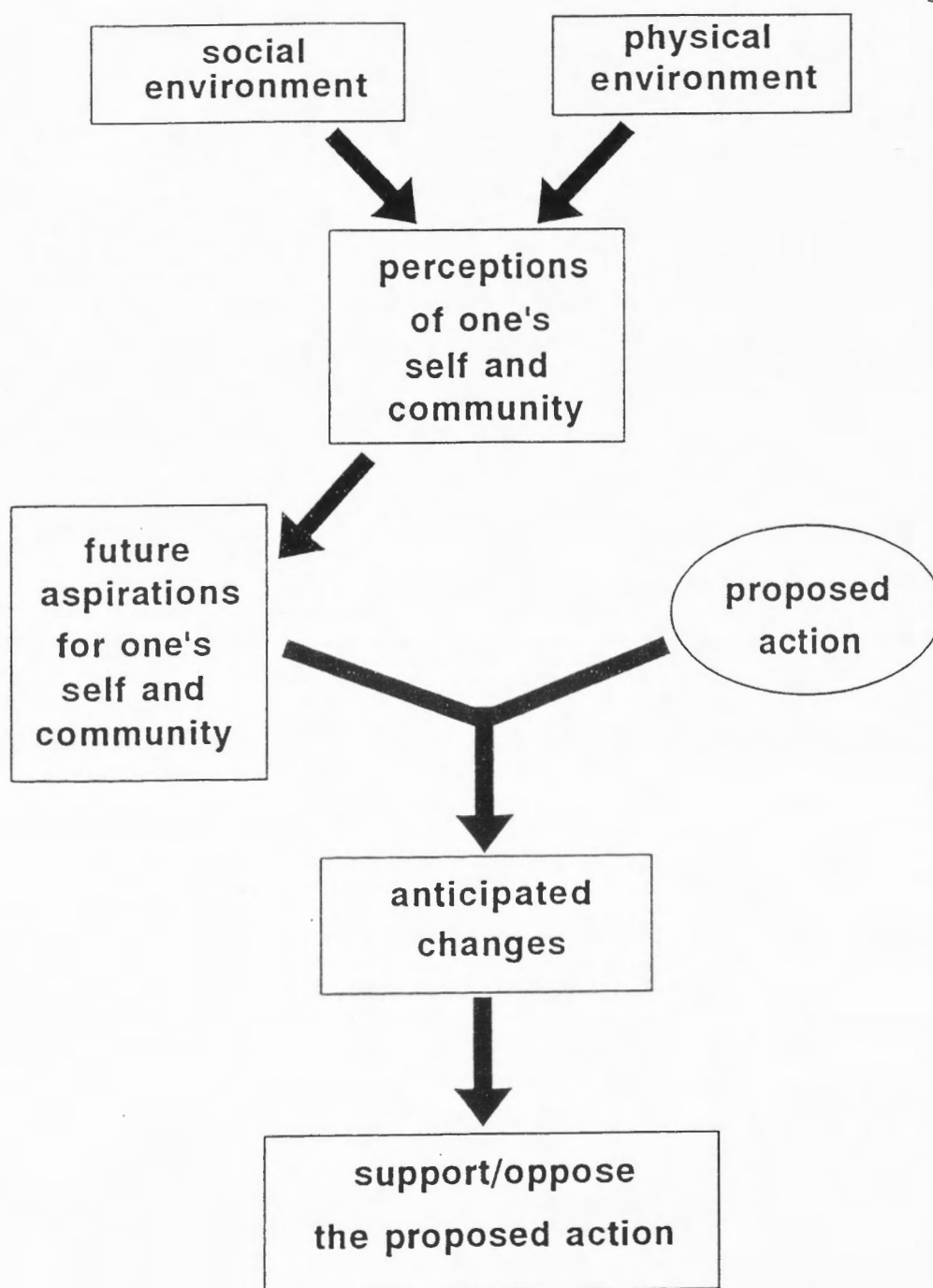


Figure 1: Theory Sketch (Source: Little 1993)



experiences, or the reputation of the initiators and proponents of the proposed action), leading to an evaluation of the action.<sup>22</sup> Thus, anticipated changes are determined by a comparison of future community aspirations and the characteristics of the proposed action as depicted by the project descriptions (Little 1993).

Among the future aspirations and anticipated changes, some issues will be more salient to residents than others. It may be the case that direct (primary) project impacts will be considered more salient than indirect (secondary)<sup>23</sup> project impacts or vice versa.<sup>24</sup> Direct impacts are usually limited to economic and population projections offered by

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<sup>22</sup>It is possible that the proposed action could be evaluated by residents independently from their future community and individual aspirations. However, this model posits that aspirations for future individual and community well-being precede the proposed action in time. Furthermore, the model suggests future aspirations and knowledge of the proposed action will operate in conjunction to influence anticipated changes which result from the proposed action.

<sup>23</sup>"The principal direct project [impacts] . . . tend to be economic and demographic since it is primarily through people, jobs, income, and resource change that the proposed action interacts with the existing environment to produce social change" (Branch et al. 1984:175). The indirect project impacts may include: (1) perceived risks, such as potential impacts to the environment or health and safety of residents (both current and future generations); (2) increased friction between segments of the population (long- and short-term residents; property and non-property owners); or (3) altered feelings of community attachment.

<sup>24</sup>The saliency of the various impacts is unknown. However, knowledge of the community context helps clarify the viewpoints of local residents.

project developers. The extent to which residents believe and/or accept the projected information is uncertain. For example, a project may project the creation of two hundred new jobs and contributing large amounts of tax revenue for the community.<sup>25</sup> The extent to which residents believe and/or accept this information will likely vary depending upon any number of factors (e.g., past experience, levels of trust, etc.). Whether people believe projections about impacts is also, in part, determined by desired future states. At the present time, it is difficult to assess how residents make their determinations and evaluate the importance of issues.

After evaluating the proposed action in terms of desired future states, a balancing or weighing process occurs between future aspirations and anticipated changes from the proposed action. The outcome of balancing these issues will determine whether the proposed action is supported or opposed. That is, after balancing the issues, if the salient anticipated changes are perceived as positive, then the proposed action will most likely be supported. For example, if generating more jobs is the

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<sup>25</sup>Although direct and indirect project impacts may indicate certain outcomes, rarely do the outcomes occur precisely as planned (Branch et al. 1984). Regardless of whether the direct and indirect impacts eventually occur, perceptions of proposed action outcomes are likely contributing factors in residents' decision-making processes.

most salient issue, support for the proposed action is likely, even if some or perhaps most projected impacts are perceived as negative. However, if after balancing the issues, the salient anticipated changes are perceived as negative, then the proposed action will be opposed. Thus, if limiting population growth is the most salient, opposition is likely even if other projected impacts are perceived as generally positive.

To operationalize this model, perceptions of quality of life will be the primary focus. Unfortunately, there are several conceptual problems associated with the concept of quality of life. Therefore, before discussing the propositions which follow from this theoretical orientation, it is necessary to elaborate on the conceptual issues plaguing quality of life research.

#### *Quality of life conceptual issues*

Quality of life is a difficult concept to quantify. Debates over its definition and measurement remain an unresolved issue in the literature (see Rogerson et al. 1987, 1989). The lack of determinacy and uniformity of usage (Hempel 1952) is in large part due to an absence of theoretical direction in quality of life research (Sirgy 1986).

The lack of theoretical direction in studies of quality of life is not uniquely sociological. Several disciplines have maintained an interest in measuring

quality of life: geography (Cutter 1985), economics (Liu 1976), psychology (Campbell 1981), and political science (Milbrath 1979). Work in these several fields has culminated in the formation of the *Social Indicators Research* journal. The interdisciplinary focus of the journal reinforces the diversity of measurement and theoretical issues related to quality of life.

A contributing factor to the difficulty in assessing quality of life is its inherently subjective<sup>26</sup> nature, as the following suggests:

Quality of life is a very personal expression of one's sense of well-being. In a very real sense it expresses that set of "things" which, when taken in the aggregate, makes the individual happy. Yet, it is also probably true that if asked to express the details of this aggregate, an individual would provide a somewhat different set each time he is queried (EPA, Quality of Life Concept 1973). (Markley and Bagley 1975:1)

Although difficulties persist in uniformly defining and measuring quality of life, it remains a useful concept in understanding the context within which people live.

Early sociological studies which can be reasonably viewed as addressing quality of life issues were primarily studies of community change and urban disorganization (e.g., Durkheim 1893/1933; Toennies 1887; Wirth 1938).

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<sup>26</sup>Researchers generally agree that quality of life consists of both objective and subjective components; the former is an indirect way of measuring the concept (e.g., assessing crime rates or number of parks per neighborhood), whereas the latter refers to directly obtaining an individual's perceptions of quality of life.

These studies suggested community solidarity and well-being were negatively impacted by increases in population size, density, and heterogeneity.<sup>27</sup>

More recently, quality of life has been used by researchers in various ways. In a study of quality of life and community growth, Eadington (1975) focuses on the objective costs and benefits. He notes that individuals vary significantly as to what they view as important (salient) aspects of quality of life. Although Eadington looks at several aspects of quality of life, he leaves the meaning of the concept itself implicit rather than explicit.

Markley and Bagley (1975:viii), on the other hand, define quality of life as ". . . a multidimensional variable that expresses the degrees of well-being of persons in the society." They suggest that quality of life consists of subjective attitudes toward objective conditions within a given population.

Cutter (1985) offers a geographer's view of quality of life by not only looking at individual well-being, but placing the concept in a community (place) context. Specifically, for Cutter (1985:1)

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<sup>27</sup>However, there is also a body of subsequent research that has questioned the uniformly detrimental effects of community change on relationships (Bender 1978; England and Albrecht 1984; Fischer 1975; Goudy 1990; Hunter 1975; Kasarda and Janowitz 1974; Sampson 1988; Wellman 1981; Wilkinson 1986).

the geographic definition [of quality of life] includes both objective and subjective measures of social and environmental conditions in a place and how these conditions are experienced by the people living there.

Within this perspective Cutter identifies three important dimensions: social (e.g., crime, housing, income), environment (e.g., climate, pollution), and perceptual. The perceptual component ". . . incorporates the relative importance of objective conditions (social and environmental) with a more subjective assessment of people's images of a place, their views toward that place, and their experiences and attachments to a place" (Cutter 1985:2).

Similarly, Lewis and Lyon (1986) examine the relative importance of the local environment and perceived life quality. In doing so, however, they appear to use the concepts of overall satisfaction and quality of life interchangeably, without clearly defining either one.

Wish (1986:95) reviewed numerous definitions of quality of life and notes that

although these definitions differ, they all suggest that "quality of life" to a greater or lesser extent consists of two basic ingredients, an operational or environmental and a psychological milieu. In other words, they all include a situation or condition that is perceived by an area's residents and translated by them into varying degrees of a sense of well-being.

### *Conceptual problems*

The above discussion illustrates the main conceptual



confusion with the term quality of life: issues of definition and operationalization. The first problem is simply that many studies fail to define quality of life, that is, they leave the definition implicit in their discussion. For example, several studies suggest using objective and subjective indicators to assess quality of life, yet they fail to define quality of life (Eadington 1975; Lewis and Lyon 1986; Taylor 1987).

The second problem in defining quality of life is that when a definition is offered, it is defined operationally; that is, by the measurement procedure examined. Because there is agreement that the concept is multidimensional, the factors used in assessing quality of life vary among studies. As an illustration, Taylor (1987) reviewed several quality of life polls taken in various newspapers throughout the U.S. and found wide variation among the items included in the poll. More importantly:

What was interesting about all these surveys was that none of them actually asked the public what they thought was meant by the term quality of life, and in each case the perception of the pollsters was different, depending on the area in which the poll was conducted and by whom the survey was conducted and paid for. (Taylor 1987:1)

Thus, there was no common base of reference for quality of life among the newspaper polls.

#### *A heuristic definition*

The conceptual fuzziness of quality of life demands



that it be explicated.<sup>28</sup> What follows is an explication of quality of life which provides a useful conceptualization for application in the context of interpreting the opinions of residents most likely affected by proposed actions.

The general consensus is that quality of life is multidimensional, consisting of subjective and objective indicators which vary by individuals, over time, and between communities. This suggests that a useful definition of quality of life must include these aspects. In addition, the description of quality of life by Cutter (1985), along with the findings of Lewis and Lyon (1986), suggests that residents' quality of life perceptions are relevant to their community context.

Typically, quality of life has also consisted of objective indicators; however, for the purposes of this study, only the subjective issues will be examined.<sup>29</sup> By taking the above views into account, quality of life can be

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<sup>28</sup>According to Hempel (1952:11), "Explication is concerned with expressions whose meaning in conversational language or even in scientific discourse is more or less vague . . . and aims at giving those expressions a new and precisely determined meaning, so as to render them more suitable for clear and rigorous discourse on the subject matter at hand."

<sup>29</sup>The theory sketch guiding this study posits that current and future aspirations for one's self and community will operate in conjunction with information on a proposed project to yield anticipated changes from the proposed project. Since the focus of this study is on individual's perceptions, the heuristic definition of quality of life will be limited to its subjective elements.

defined as an individual's subjective interpretation and evaluation of personal and community well-being, viewed from the context of their social and physical environments.

### *Measuring quality of life*

The ways in which researchers have operationalized the concept of quality of life varies, and it is questionable whether a generalized and exhaustive list of indicators can ever be put together (Rogerson et al. 1987). In this study, quality of life will be operationalized by using questions specific to current evaluations and future aspirations regarding self and community. Two of the more common subjective indicators found in the literature will be used: (1) individual and community satisfaction, and (2) community attachment.

Measurements of community and personal satisfaction have been used by a wide range of researchers (e.g., Baldassare 1986; Brown et al. 1989; Hughey and Bardo 1984, 1987; Lewis and Lyon 1986). Hughey and Bardo (1987:240) suggest that

satisfaction with community should be linked with individual perceptions of overall quality of life since, by definition (Arensberg 1954) the community is the arena in which most life events are directly experienced. It is also in the community that individuals engage in most significant day-to-day interactions and from which they draw many of their most significant norms, values, and beliefs (Feldman 1979).

Furthermore, community satisfaction is one component of quality of life that ". . . is typically very important to

people in rural areas" (Branch et al. 1984:120).

Satisfaction, personal and community, is often related to economic and employment issues. Taylor (1987:2) noted that ". . . for most Americans there seems to be a very strong overlap between economic well-being and quality of life." Therefore, economic and employment issues are individual components of community satisfaction, which are of particular importance to residents.

Another common indicator of quality of life involves evaluations or measurement of community attachment (e.g., Brown et al. 1989; England and Albrecht 1984; Fitchen 1989; Gerson et al. 1977; Goudy 1990; Guest and Lee 1983; Kasarda and Janowitz 1974; Marans and Rodgers 1975; Sampson 1988; St. John et al. 1986). It has been argued that attachment to and satisfaction with a community are distinct concepts composed of different variables (see Guest and Lee 1983; St. John et al. 1986), although St. John et al. (1986:412) do concede that

it is reasonable to expect that satisfaction with particular community characteristics might be related to community attachment. That is, those who express a high level of satisfaction with attributes of their communities also might tend to express a higher level of attachment to them.

Thus, for the purposes of this study, current perceptions of quality of life will be assessed by utilizing measures of both community satisfaction and community attachment.

### *Propositions*

The conceptual argument for this study posits that current and future perceptions of individual and community quality of life are important issues to residents. It follows that people who are satisfied with their quality of life will not want to see that altered. It also follows that a proposed action introduced to an area will result in residents of nearby communities anticipating changes. These anticipated changes will be evaluated in light of the future aspirations residents hold for themselves and the community. Furthermore, it is argued that residents who are satisfied with the various aspects of quality of life and view the anticipated changes as negatively affecting current and future quality of life aspirations will be more likely to oppose the proposed action than those residents who view anticipated changes as enhancing current and future quality of life aspirations.

Furthermore, the saliency of quality of life issues is likely to vary by community. Given that quality of life is a multifaceted concept, and as used here consists of issues of community satisfaction and attachment, it is possible for residents of distinct communities to perceive these aspects of quality of life differently. Moreover, if residents perceive quality of life differently, they are likely to perceive potential changes to themselves and their communities differently.

The community, in part, shapes the perceptions of its residents. In order to understand differences in perceptions of quality of life, anticipated changes, and project support, it is important to know about the community. Therefore, it is to be expected that residents of different communities with different histories and experiences will exhibit varying levels of satisfaction with their quality of life, anticipated changes, and support for a particular project.

Beyond the expectation of community variation, the theory sketch described earlier in this chapter suggests seven general propositions. These propositions illustrate potential relationships between perceptions of quality of life, anticipated changes from any proposed action, and support/opposition to the proposed action.

The basis of the theory sketch is that prior to the introduction of a proposed action, residents have opinions about their current levels of individual and community satisfaction. Taylor's (1987:2) review of opinion polls revealed that "most people tend to like what they have and the places in which they live, wherever they live." In a similar fashion, most rural residents are generally satisfied with their overall quality of life (Murdock and Shriner 1978). Furthermore, although levels of satisfaction vary across communities, most rural residents have generally high levels of satisfaction with their

community (Murdock and Shriner 1978). Therefore, it is assumed

P<sub>1</sub>: Residents in rural communities tend to exhibit general satisfaction with their community and overall quality of life.

Even though rural residents tend to be generally satisfied with their community, economic and employment issues are specific areas of importance to local residents. Economic and employment issues are particularly salient since many, if not most, rural communities lack economic diversity (e.g., natural resource-dependent communities). Natural resource-dependent communities are especially susceptible to boom-and-bust cycles related to the extraction and/or processing of natural resource commodities. Similarly, communities largely dependent on mono-economic structures (e.g., government-dependent communities) face problems of instability. Government activities are vulnerable to the economic and social consequences of potential political shifts (Flora et al. 1992) rather than the availability of natural resources.

The uncertainty of economic and employment stability may lead rural residents to perceive their community as unsatisfactory in terms of economic and employment opportunities.<sup>30</sup> It is therefore assumed

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<sup>30</sup>Although some rural areas may have economic alternatives, they may still exhibit dissatisfaction due to the types of jobs available (e.g., low-paying).



P<sub>2</sub>: Residents in rural communities that lack economic diversity are generally dissatisfied with available employment and economic opportunities in the area.

Improving the economic opportunities of an area may be one of many future aspirations or goals identified by community residents. As indicated in the theory sketch, when a proposed action is introduced, residents will evaluate their future aspirations in light of information about the project. From this evaluation process changes resulting from the project are anticipated. Thus, researchers are not only interested in potential outcomes (e.g., social changes) from the proposed project, but also in residents' perceptions of the desirability of the outcomes (Branch et al. 1984; Lounsbury et al. 1983). Important as it may be, it is difficult to anticipate how residents will perceive the future changes. Be that as it may, anticipated change by itself may be enough to sway residents' decisions toward proposed projects (e.g., Krannich and Little 1989; Lounsbury et al. 1983). Perceptions of risks to the environment, health and safety of the area, and changes in the economic well-being of area residents are anticipated changes likely to influence residents' opinions toward a proposed action.

In a longitudinal study of a rural energy development community, Brown et al. (1989) were able to assess resident's perceptions of community conditions at various



phases of development associated with a coal-fired electric generating station. They concluded that important anticipated changes occurred during the period after announcement of the project but prior to the period of rapid growth associated with project construction (Brown et al. 1989).

Similarly, Gramling and Freudenburg (1992:217) note that ". . . measurable impacts begin as soon as there are changes in *social* conditions -- often from the time when information about a project first becomes available." Freudenburg and Gramling (1992:941) further note that ". . . a variety of other social and economic impacts take place, particularly in the case of facilities that are large, controversial, risky, or otherwise out of the range of ordinary experiences for the local community." Therefore, it is important to assess the extent to which residents of rural communities perceive or anticipate changes due to proposed projects. Therefore, it is assumed

P<sub>3</sub>: Rural residents are likely to anticipate social and environmental changes in their community due to proposed actions.

Anticipated changes due to a proposed project may be influenced by whether residents perceive their quality of life being altered by the proposed action. Respondents who indicate high community satisfaction and overall quality of life will likely not want to see that altered. Therefore, if P<sub>1</sub> and P<sub>3</sub> are true, residents will likely oppose the

proposed project. Specifically,

P<sub>4</sub>: Rural residents who indicate high satisfaction with their community and overall quality of life and perceive negative changes due to proposed projects will likely oppose the proposed action.

As noted above, economic and employment issues are specific areas of satisfaction important to residents. Furthermore, rural areas tend to lack economic diversity and/or employment opportunities. Therefore, rural residents who indicate low satisfaction with their current economic situation (P<sub>2</sub>) are likely to welcome a project they perceive as enhancing their current economic situation (Bourke 1991). The introduction of a large-scale project to an area is likely to be perceived as a stimulus to the local economy, even if only for the short-term.<sup>31</sup> Therefore, residents are likely to favor projects symbolizing economic and employment benefits for the area. Specifically,

P<sub>5</sub>: Where economic and employment satisfaction is low, perceived economic benefits from the proposed project will be high.

Furthermore,

P<sub>6</sub>: Rural residents who perceive low satisfaction with the available economic and employment opportunities within their community and anticipate economic benefits resulting from the proposed project are likely to support the

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<sup>31</sup>Studies on boom towns have shown that due to the large influx of construction workers to the area, segments of the local economy show increased revenues (see Brown et al. 1989).

proposed action.

Community attachment is yet another component of quality of life. Goudy and Ryan (1982:260) suggest that ". . . community attachment needs to be evaluated as either an outcome or a constraining factor of programs affecting rural communities." Rural residents who indicate attachment to their community will likely want to prevent undesirable projects and potential negative impacts from threatening the area ( $P_3$ ). In this situation, community attachment may be perceived as a constraining factor to the development of a proposed action (see Wilkinson 1991). Thus,

$P_7$ : Rural residents who indicate high attachment to their community and anticipate negative changes because of the proposed project, will be more likely to oppose the proposed action.

### *Hypotheses*

From the seven general propositions, the following hypotheses have been derived.<sup>32</sup>  $P_1$  indicated that rural communities tend to be satisfied with their way of life; therefore, it is expected that:

- $H_{1a}$ : Residents in the study communities will display general satisfaction with their quality of life.
- $H_{1b}$ : Residents in the study communities will demonstrate a high overall level of community satisfaction.

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<sup>32</sup>The number for each hypothesis corresponds to the proposition from which it was derived.

Economic issues are specific components of satisfaction that are important to rural residents.  $P_2$  reflected this common concern, especially in those rural communities that lack economic diversity. Economic satisfaction is commonly operationalized by using employment variables. Therefore, the following two hypotheses are put forth:

$H_{2a}$ : Residents in the study communities will demonstrate dissatisfaction with their economic situation.

$H_{2b}$ : Residents in the study communities will demonstrate dissatisfaction with available employment opportunities in the area.

The logic underlying  $P_3$  is that residents anticipate changes due to proposed projects. Given the size of the proposed facility and nature of the materials (e.g., nuclear) facing residents involved in this study, the following hypothesis is derived:

$H_3$ : Residents in the study communities will anticipate that there will be changes associated with the proposed repository.

The assumptions leading to  $P_4$  indicate that if  $P_1$  and  $P_3$  are true, the residents will likely oppose a proposed project. The following two hypotheses follow the same logic, that is, if  $H_{1a}$  and  $H_3$  are true, the residents will oppose the proposed repository. Similarly, if  $H_{1b}$  and  $H_3$  are true, then residents will oppose the proposed repository. More specifically,

$H_{4a}$ : If satisfaction with quality of life is high and anticipated changes due to the proposed repository are negative, then respondents will

oppose the repository.

- H<sub>4b</sub>: If community satisfaction is high **and** anticipated changes due to the proposed repository are negative, then respondents will oppose the repository.

The following hypothesis derives directly from P<sub>5</sub>, which addressed the importance of perceived economic and employment issues. That is, residents who are dissatisfied with their current situation will likely view a large project as satisfying that need. Specifically,

- H<sub>5</sub>: If economic and employment satisfaction are perceived as low, then respondents in the study communities will anticipate positive economic changes from the proposed repository.

The logic leading to the following two hypotheses suggests that if H<sub>5</sub> is true, then residents are likely to support the proposed project. Therefore,

- H<sub>6a</sub>: If economic satisfaction is low **and** there are positive economic changes anticipated due to the proposed repository, then respondents will support the repository.
- H<sub>6b</sub>: If employment opportunities are viewed as low **and** there is anticipated positive economic change due to the proposed repository, then respondents will support the repository.

The final proposition (P<sub>7</sub>) states that if residents are attached to their community, and they anticipate a proposed project negatively altering that community, they will oppose the proposed project. Thus,

- H<sub>7</sub>: If respondents demonstrate community attachment **and** anticipate negative changes due to the proposed repository, then respondents will oppose the repository.

## CHAPTER IV

### THE STUDY SETTING

This chapter provides a community and regional overview of the study area. It is provided to orient the reader to important characteristics of the study area. Such characteristics aid our understanding of residents' social context, which in turn influence perceptions and responses to the proposed Yucca Mountain project. However, prior to a description of the study area and specific study communities, it is important to understand the broader context within which this study takes place.

#### *Background to the nuclear waste issue*

The attempt to site the nation's first high-level nuclear waste repository is not a recent event. Rather it is the culmination of years of congressional debate over what to do with high-level radioactive waste. The need to store or dispose of high-level radioactive waste has been an ongoing issue since the beginning of the nuclear age in the 1940s. Although the storage or disposal of high-level nuclear waste is an acknowledged necessity, devising a safe system of handling the waste does not appear to have been a high priority for either the federal government or the nuclear power industry.

Before 1970, little incentive existed for scientists and others involved in the creation of hazardous nuclear



products to concern themselves with the problem of radioactive waste disposal. They seemed to operate under the assumption that hazardous waste technology would advance automatically as related nuclear research evolved (Strolin 1987). Similarly, no legal obligation for commercial nuclear producers existed to address the waste issue since ". . . the federal government ha[d] always assumed responsibility for the ultimate disposal of the spent nuclear fuel" (Beaver 1990:358-359).

By the late 1970s public awareness of the uncertainties of nuclear production, fueled by media accounts of reactor accidents and waste mismanagement, threatened the continued promotion of nuclear power (Jacob 1990; Weart 1988). Supporters of nuclear power and related industries (e.g., nuclear medicine and military weapons producers) were concerned over potential plant shutdowns, as well as drastic cuts in research, unless a safe disposal system was developed. Yielding to political and economic pressures to find a solution to the waste issue, the 97th Congress passed The Nuclear Waste Policy Act (NWPA) in 1982, mandating the construction and operation of a high-level nuclear waste repository.

Originally, NWPA required construction of two long-term facilities, the first one to be placed in the West, with a later facility to be constructed in the East. However, the 1987 amendments to NWPA restricted site



characterization<sup>33</sup> to one site: Yucca Mountain, Nevada. Additionally, the requirement for an eastern repository site was eliminated. The decision to focus characterization efforts on Yucca Mountain was made by the House Interior Committee. Serving on this committee were representatives from the states of Louisiana, Washington, and Texas, but none from Nevada (Hancock 1988).

The siting process, including Congress' decision to restrict characterization to Yucca Mountain, has received much criticism and attention by both the scientific community and the public (Bella et al. 1988a, 1988b; Brown and Lemons 1991; Bryan 1987; Hadden 1991; Lemons and Brown 1990; Lemons et al. 1989; Malone 1990; Muranskas and Shelley 1986; Rosenbaum 1992). Since southern Nevada is currently the only region of the country being considered as a host to the first high-level nuclear waste repository, it is important to examine the reactions and viewpoints of Nevada residents to the proposed Yucca Mountain project.

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<sup>33</sup>According to the NHPA (42 USC 10101), site characterization means "(A) siting research activities with respect to a test and evaluation facility at a candidate site; and (B) activities, whether in the laboratory or in the field, undertaken to establish the geologic condition and the ranges of the parameters of a candidate site relevant to the location of a repository, including borings, surface excavations, excavations of exploratory shafts, limited subsurface lateral excavations and borings, and in situ testing needed to evaluate the suitability of a candidate site for the location of a repository . . . ."

### *Southern Nevada*

Nevada residents have expressed widespread public concern and political frustration over the proposed high-level nuclear waste repository. Little opposition was anticipated by lawmakers over the decision to reduce site characterization to Yucca Mountain, primarily because Yucca Mountain is located on federal land, adjacent to the Nevada Test Site (NTS). The use of the land is thus restricted because of the weapons testing activities at NTS (Jacob 1990). Furthermore, the state of Nevada lacked the requisite political power in Congress to mount effective opposition. As a result, the 1987 Amendments to NWPA, which designated Yucca Mountain as the *only* site to be characterized, surprised no one. In Nevada, the 1987 Amendments are frequently referred to as "The Screw Nevada Bill" (Davis 1988).

Although significant public resistance to the amendments apparently was not anticipated, statewide surveys suggest strong opposition to the proposed repository among Nevada residents. Of particular concern to Nevada residents are potential health and safety risks (Center for Survey Research 1988).

Additional public concerns center on equity issues. Many question the fairness of Nevadans being *forced* to shoulder the burden of storing the entire nation's nuclear waste (Kunreuther et al. 1988). Unlike other federal

projects in southern Nevada, such as NTS and Nellis Air Force Base, projects that appeal to area residents' patriotic duties, the proposed repository involves waste largely generated by non-government-owned utility companies, most of which are located in the East and Midwest.<sup>34</sup> The question asked by Nevadans and others is, "[O]n what grounds can a federal agency justify asking a state to use its territory as a backyard disposal site for wastes that were generated by private firms in other states?" (Downey 1985:80).

An additional equity issue has also generated public tensions, this time between rural and urban (primarily Las Vegas) residents. Many rural residents believe that their needs and opinions are discounted or ignored by state officials when considering the nuclear waste issue (Krannich and Little 1987a, 1987b, 1987c; Little and Krannich 1987a, 1987b, 1987c). Many rural residents fear that any potential benefits (especially economic) generated by the proposed Yucca Mountain facility will be unfairly distributed to urban residents while they are left with the

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<sup>34</sup>Jacob (1990) identified the geographical pattern of nuclear power sites across the United States at the time of NWPA's passage. He identified 86 facilities licensed to operate, 50 in the process of being built, and 2 in the planning stage for a total of 138 facilities. Of the 86 facilities licensed to operate, only eight were in areas west of the Rocky Mountains; only 6 of the 50 being built and none of the planned facilities were located in the West.

potential costs (Trend et al. 1988a, 1988b, 1988c).

Beyond the urban/rural equity issue, there are additional concerns unique to rural Nevada residents. Such concerns, however, are not readily discernable from statewide polls, which generally reflect the perceptions of urban residents. Residents living in small rural communities proximate to Yucca Mountain and/or living in towns along probable transportation routes are those most likely to be impacted by the proposed repository. To understand their concerns and to meaningfully interpret information obtained from residents within these rural areas, it is important to understand the social context, and to know this one must have knowledge of the community within which they live. Understanding the social context requires a brief discussion of the history (e.g., cultural, societal and economic development) of the area (Albrecht and Thompson 1988; Branch et al. 1984).

Three social/cultural factors are particularly important to understanding the communities involved in this study: (1) their history of settlement; (2) the degree of their natural resource dependence; and (3) the history of federally funded employment projects. Knowledge of these three factors provides insight into community value systems and helps explain residents' views of their relationship to the surrounding natural and social environments.

### *History of settlement*

In general, southern Nevada has a relatively short settlement history compared to other areas of the United States. Thousands of miles of desert, rugged mountains, and the scarcity of water have all contributed to Nevada's delayed growth. Not until the early 1800s (over 200 years after the settlement in New England) did white explorers enter the region now known as Nevada (Hulse 1981). The discovery of gold in California in 1849, and the subsequent rush to the gold fields, transformed Nevada settlement.

Originally, the trails of the Nevada region were treacherous and claimed the lives of many early explorers and settlers. However, trading posts and supply centers quickly emerged to ease the rigors of the trails as gold seekers traversed the continent in search of riches. The advance of railroads also produced small settlement towns which operated as service and transportation centers to miners, ranchers, and immigrants.

The two predominant groups to stake early claims in southern Nevada were members of the Church of Jesus Christ of Latter-Day Saints (Mormons) and miners. The Mormons primarily settled the area as part of their religious colonization of the Great Basin region (see Arrington 1958). As part of their mission, Mormon settlers cultivated the land and traded goods with those migrating throughout Nevada and onward to California. Life within

these Mormon settlements was centered on church activities that encouraged a homogeneity of values and beliefs. Until the late 1860s, Mormons were discouraged from participating in mining activities. Yeoman farmers and skilled craftsmen were the occupational ideal.

Miners, on the other hand, staked claims in order to search for gold and silver in the nearby mountains and canyons, and mining communities were established. Within these mining towns, there existed a great deal of independence and freedom among residents. Whereas the miners were exploiting the natural resources of the land quickly and then moving on to the next potential mining strike, the Mormons exploited the land in another way, cultivating the land for crops, establishing permanent communities in the process.

The cultural and economic lifestyles characteristic of early rural settlements persist in many southern Nevada communities today. The spirit of independence and laissez-faire economics can still be found in towns that evolved from early mining settlements (e.g., Goldfield). Similarly, communities originally settled by the Mormons (e.g., Panaca) still exhibit homogeneity among residents, and many of the town's activities still revolve around church activities, albeit to a lesser extent than in earlier days.



*Natural resource dependence*

As noted in the previous section, many of the rural towns in southern Nevada grew in response to extraction and/or processing of natural resources: minerals and agriculture. The cultural and economic foundations of such communities rested upon the continued availability of those resources. Many of these communities have experienced varying levels of economic and employment instability associated with natural resource exploitation. For those communities that lack alternative sources of economic viability, the depletion of the natural resource base can have devastating consequences for their future cultural and economic survival. Exacerbating the problems associated with natural resource dependence is the problem that control over the extraction and/or processing of the resource often lies beyond local residents. Such is the case in southern Nevada, wherein many of the larger mining and milling operations maintain corporate headquarters outside the state of Nevada (e.g., Bond/Bullfrog Incorporated).<sup>35</sup> Thus, residents in these communities are essentially powerless over the forces (e.g., economic and political) that control their destinies (Endter 1990).

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<sup>35</sup>Trend et al. (1988b:6) note that there still exist small, locally owned mines in some areas, however they tend to employ a small number of employees (e.g., the Crowell or "Daisy" mine near Beatty ". . . employs no more than a half dozen people)."



The realization of resource depletion, and the lack of alternative sources of economic viability may result in some southern Nevada communities becoming desperate for alternative forms of economic growth. In extreme situations, residents may be forced to compromise their values in order to maintain or re-establish economic stability (Endter 1990). Endter (1990:32) notes:

The main response to natural resource dependency and economic vulnerability among rural residents of western Utah and eastern Nevada has been desperation about their local economic situations. Many of them consequently have been more willing to accept the risks and trade-offs that certain developments might entail and to sacrifice some safety, environmental quality, and aspects of their rural communities for jobs, income, and economic development. . . . The irony is that, lacking economic alternatives, residents of rural communities are often forced to give up part of what they value about their rural lifestyle in their attempts to maintain it.

As part of this process, residents desperate to obtain economic stability may lessen their standards about the types of industry they desire to locate in the area. Thus, during economically stressful periods, residents of resource-dependent communities, such as those found in the study area, may accept an otherwise undesirable facility.

#### *Federally funded employment*

Not all communities in the study area are natural resource dependent. Several of the communities rely on government-related projects to maintain economic viability. Indeed, communities and individuals in the study area are

unique in the degree to which they are dependent upon federal employment for economic stability.

The construction of Hoover Dam in the 1930s was one of the earliest federally funded projects in Nevada. Since Hoover Dam, numerous projects under the auspices of the federal government have been particularly important to the economy of southern Nevada: Nellis Air Force Base north of Las Vegas, the Nevada Test Site at Mercury, the Tonopah Test Range at Tonopah, and Indian Springs Air Force Base (see Endter et al. 1988a, 1988b, 1988c).

In the 1950s, southern Nevada became host to one of the country's largest federal defense and research projects, the atomic test site and nuclear rocket center with headquarters at Mercury, Nevada and known as the Nevada Test Site (NTS). Mercury is approximately 65 miles Northwest of Las Vegas. As with Nellis Air Force Base, most Nevada residents have been supportive of NTS activities, primarily because of the economic boost brought to the southern Nevada region (Titus 1986).

Although NTS activities brought federal money and employment opportunities to southern Nevada, rural communities have not benefitted equally. For instance, those rural communities more proximate to NTS benefitted economically, through employment and a broadened tax base. However, those rural communities further away from NTS have not reaped as many economic and employment benefits.

Costs associated with federal facilities have not been equally distributed either. The communities downwind of NTS (e.g., Caliente, Mesquite) have experienced health costs not experienced by upwind communities. In 1953, residents from communities downwind of NTS began voicing opposition to the testing in Nevada (Fuller 1984; Titus 1986). Their displeasure was primarily due to radioactive fallout from atmospheric weapons testing which negatively threatened the health and safety of humans and livestock (Fuller 1984; Titus 1986). Those residents living in upwind communities (e.g., Beatty, Amargosa Valley) experienced few of the negative effects of atmospheric testing at NTS.

Thus, experiences with NTS and other government-related activities place residents of southern Nevada in an unusual position in terms of the proposed Yucca Mountain facility. As noted by Krannich and Little (1988:2-3):

The unique experiences which Nevada has had with respect to nuclear weapons testing suggest a potential for atypical orientations and perceptions about nuclear waste issues. Nevada politicians and residents have generally been supportive of federal nuclear weapons testing programs since the first atomic test occurred at the Nevada Test Site (NTS) in 1951 (Titus 1986). Although anti-nuclear protests at NTS have increase in size and frequency in recent years, there appears to be widespread recognition of the importance of NTS and other defense programs to the economic vitality of southern Nevada and the state as a whole.

Unfortunately, many of the communities located near government-related projects not only reap the benefits, but

suffer the economic and employment consequences associated with federal cutbacks, or the termination of projects (see Flora et al. 1992). Events affecting NTS have become particularly germane to residents of the rural study communities dependent upon NTS for employment. The disintegration of the USSR, advances in nuclear disarmament, and restrictions on nuclear-related activities at NTS have all contributed to concern over the future of NTS. The storage of high-level nuclear waste thus may be perceived as the only answer to future employment security for the area.

#### *Study communities and background factors*

This study focused on the residents in six rural communities located in three southern Nevada counties: Amargosa Valley, Beatty, and Pahrump in Nye County; Indian Springs and Mesquite in Clark County; and Caliente in Lincoln County.<sup>36</sup> Each of these six communities varies in social structure and history. All differ significantly from the typical midwestern agricultural rural community. They are rural communities in terms of lifestyle, if not in terms of census definition. In spite of their differences,

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<sup>36</sup>A more extensive discussion of these communities can be found in the Baseline Community Social Structure Reports and Summary Ethnographic Reports for the Yucca Mountain Socioeconomic Research Project (Endter et al. 1988a, 1988b; Krannich and Little 1987a, 1987b, 1987c; Little and Krannich 1987a, 1987b, 1987c; Trend et al. 1988a, 1988b, 1988c).

these communities do share the instability commonly associated with the boom-and-bust cycles of resource development and government-employment activities.

### *Amargosa Valley*

The northernmost sections of Amargosa Valley adjoin the geographic boundary of the Yucca Mountain site. The town is located within 17 miles of the proposed facility.<sup>37</sup> This unincorporated town had approximately 700-750 residents spread over a 550 square mile desert area in 1988. Although the community lacked a well-defined service center and the population was widely dispersed, it nevertheless represented a close-knit community (see Trend et al. 1988a). Impacts from the repository could emerge in the area due to both its proximity to Yucca Mountain and the potential for waste transportation corridors through the area. In fact, Amargosa Valley is the closest study community to the proposed Yucca Mountain site.

Residents in Amargosa Valley have relied on employment related to agricultural development, federal projects, and mining to support the economic base of the area. During the mid-1980s, NTS employment of local residents declined. Furthermore, the 1986 shutdown of the American Borate

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<sup>37</sup>Amargosa Valley is considered upwind from the Nevada Test Site, and residents therefore did not experience most of the negative effects associated with atmospheric nuclear testing.

Corporation (ABC) mining and mill operation led to an out-migration of nearly forty percent of the residents (Little and Krannich 1987a). Prior to the shutdown, ABC employed nearly 400 people (see Little and Krannich 1987a). During the peak population of the early 1980s, Amargosa Valley developed many public facilities such as a shopping center, rental apartments, library, community center, and health clinic. However, after the closure of ABC the burden of paying for these new facilities fell upon the remaining residents.<sup>38</sup>

By the time of this study (1988) the population decline was nearly complete. The result of this was a dramatic erosion of the local tax base and a subsequent depression in the local economy. The mass exodus resulted in the closure of numerous businesses, as well as the abandonment of homes and property (see Little and Krannich 1987a). The lack of economic alternatives was evident in baseline interviews of Amargosa Valley residents. Little and Krannich (1987a:34) note that "[l]ocal political leaders as well as many other residents express a sense of economic desperation, and a willingness to support virtually any form of development that may promise increased employment activities."

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<sup>38</sup>This economic burden contributes to Amargosa Valley having one of the state's highest tax rates, which remains a major concern among area residents (Little and Krannich 1987a).



Although the population of Amargosa Valley was broadly dispersed, there existed a large degree of community solidarity, even though there were few opportunities for social interaction to occur (see Little and Krannich 1987a). Several social organizations provided the setting for social interaction, including local church organizations (with relatively small congregations), Veterans of Foreign Wars, a parent and teacher organization, and a local emergency medical technician group. There was also a senior citizens' center that catered to a small group (40-50) of elderly individuals, serving meals and providing social activities such as bingo (Little and Krannich 1987a). However, in part because of its geographical dispersion, residents did not seem to be as involved in organized activities as is typical in many rural small towns (Little and Krannich 1987a).

### *Beatty*

The town of Beatty is located on U.S. Route 95 approximately 115 miles northwest of Las Vegas. Beatty is 8 air miles and 45 highway miles from Yucca Mountain (Trend et al. 1988b).<sup>39</sup> It had a population of approximately 925 during the study period. Due to its proximity to Yucca Mountain and its location along the major highway access

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<sup>39</sup>Like Amargosa Valley, Beatty is considered upwind from the Nevada Test Site, and therefore did not experience negative effects of atmospheric nuclear weapons testing.



(U.S. 95) to Yucca Mountain, this community will likely experience significant impacts from the repository.

Historically, the town has experienced periodic boom-and-bust cycles associated with several nearby mining ventures. Beatty was located along the transportation route near the early mining center of Rhyolite, and was influenced by Rhyolite, Goldfield, and Tonopah mining cycles. After the data collection period, Beatty experienced a mining boom with a new mine in nearby Rhyolite operated by Bond/Bullfrog Incorporated (Trend et al. 1988b).

At the time of this study, the economy and population of the community were somewhat diversified, not highly dependent upon mining activities. Federal contracts, tourism/travelers, and gaming dominated the economic scene. Beatty has experienced modest population and economic growth due to employment opportunities linked to Topecha Peak, NTS, and other military testing programs. Workers associated with these federal facilities tend to be more skilled and better educated than typical service-sector employees. Although many federally linked employees resided in Beatty, often their families resided in and the workers spent weekends and other free time in Las Vegas. These residents were thus less likely to be involved in community affairs than other Beatty residents (Trend et al. 1988b).

The Beatty economy has benefitted from tourism/traveler dollars. Many tourists visit nearby Death Valley, and people traveling between Las Vegas and Reno buy gas and food, or stay overnight and gamble in Beatty. There were three casinos, seven bars, and several other local service-oriented businesses in the area which employed local residents. Wages for these jobs, however, hovered around minimum wage and most required relatively limited job skills (see Trend et al. 1988b). A low-level nuclear waste landfill located a few miles south of town on U.S. Highway 95 completes the economic structure. However, this facility provided only a handful of jobs (see Trend et al. 1988b).

In spite of limited economic opportunities in Beatty, residents expressed a sense of community (Little and Krannich 1987b). Information from baseline data collection indicated that residents considered the area slow-paced and friendly, where everyone knows almost everyone else and is willing to help each other out when needed (see Little and Krannich 1987b).

There were several organizations that provided opportunities for social interaction. Recreational activities served as a major source of bringing people together, with an active softball program for both youths and adults. Similarly, the local high school (which also served Amargosa Valley youths) brought community members

together, enhancing community spirit (Little and Krannich 1987b). The volunteer fire department and emergency medical technicians (EMTs) also played an active role in the community, sponsoring community activities such as picnics, raffles, and fireworks. To a lesser extent religious organizations exhibited a similar function of bringing people together; however, unlike study communities in Lincoln county, no one congregation dominated the populace (see Trend et al. 1988b).

These and other organizations (e.g., American Legion, Business and Professional Women, and Parent and Teacher Associations) helped integrate the residents of Beatty. Even though Beatty had an unstable economic history, the residents still maintained a sense of community.

### *Indian Springs*

Indian Springs is located on U.S. Route 95, 43 miles northwest of Las Vegas and 61 highway miles southeast of Yucca Mountain.<sup>40</sup> Due to its proximity to the proposed repository site and its location along a potential transportation route, Indian Springs could experience potential employment and economic impacts from the repository.

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<sup>40</sup>Indian Springs is considered upwind from the Nevada Test Site, and therefore did not experience most of the negative effects associated with atmospheric nuclear testing.

Prior to World War II (WWII), there were few residents in Indian Springs (Krannich and Little 1987a). The development of the Indian Springs Air Force Base and Indian Springs Gunnery Range caused the community to grow after WWII. The establishment of the Nevada Test Site in 1950 (Titus 1986) also contributed to the growth of Indian Springs. The population of Indian Springs was approximately 1600 at the time of the study (1988). The main entrance to NTS (Mercury) is only 20 miles northwest of town, and the community has benefited from government-related employment opportunities. NTS contractors and subcontractors employed the majority of residents. Indian Springs Air Force Base also provided substantial employment. In addition, a state-operated correctional center located 8 miles east of town employed a few local residents. Jobs at these facilities tended to be high-paying, relatively stable, union jobs (Endter et al. 1988b). A small private sector which offered some service-oriented employment to the area, e.g., a casino, country-store, restaurant, and a couple of gas stations, rounded out the economic scene during the study period.

Indian Springs, for the most part, was dependent upon government-related jobs to maintain the economic and employment stability of the community. This was evident in initial baseline interviews of Indian Springs residents, wherein concern was expressed about potential reductions or

closure of Indian Springs Air Force Base (see Endter et al. 1988b; Krannich and Little 1987b). Although there were some recent losses of military employment, the population had remained relatively stable since the 1950s (Krannich and Little 1987b).

Unlike some of the other study communities (e.g., Amargosa Valley and Pahrump), Indian Springs is geographically compact, with residents living in relatively close proximity to each other. Such a scenario would ordinarily suggest a high degree of social and cultural integration. However, initial baseline information obtained from this community suggested that although residents recognized one another and felt neighbors would watch out for one another, there was little formal organization or social participation among residents (Endter et al. 1988b; Krannich and Little 1987b).

There were few formal organizations in Indian Springs, e.g., a few churches (Baptist, Catholic, Church of Jesus Christ of Latter-Day Saints) with none boasting a majority of the population. Furthermore, most people commuted to Las Vegas to satisfy their cultural and social needs, as well as shopping and medical requirements (see Endter et al. 1988b; Krannich and Little 1987b).

Although there did not seem to be a high degree of community solidarity, people with families and children exhibited greater integration (Endter et al. 1988b;

Krannich and Little 1987b). There was also a small, but growing, senior citizen population which had obtained a senior center in early 1988.

### *Pahrump*

Pahrump is located approximately 55 air miles from Yucca Mountain and 63 highway miles from Las Vegas via State Route 160.<sup>41</sup> Potential impacts from the proposed repository may be experienced by residents in Pahrump due to its proximity to the repository site and the possibility that waste transportation corridors may pass nearby.

Originally, the Pahrump area was a sparsely populated agricultural community. Because of its proximity to Las Vegas, Pahrump became a convenient place for residents who wanted the serenity of small-town life, yet access to big-city conveniences. Beginning in the 1960s, Pahrump began to serve as a place of residence for workers at NTS. However, it was not until the late 1970s that Pahrump experienced any significant population boom. The impetus of this boom was the purchase and subsequent subdivision of agricultural lands into residential lots. Accompanying the rapid population growth has been an expanded casino/hotel complex, shopping complex, supermarket, and new bank (see

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<sup>41</sup>Pahrump is considered upwind from the Nevada Test Site, and therefore did not experience most of the negative effects associated with atmospheric nuclear weapons testing.



Little and Krannich 1987c; Trend et al. 1988c). The population at the time of the study period was approximately 7,000.

The economy of Pahrump, in addition to NTS employment, was primarily that of service-oriented businesses catering to the commuters, tourists, and retirees. Beyond service-oriented businesses, some employment was provided by the local school district.

Like Amargosa Valley, Pahrump residents were dispersed over a large geographical area (364 square miles). The town's commercial activities were also widespread, with little sense of a town center, although one was emerging (see Little and Krannich 1987c; Trend et al. 1988c). The community was more heterogeneous than the other Nye County study communities, primarily due to its recent growth, the influence of Las Vegas, and the recent immigration of retirees. There were thus a variety of organizations (approximately 38) serving this diverse population (see Little and Krannich 1987c). Although there were numerous churches, the Church of Jesus Christ of Latter-Day Saints (Mormons) exerted more influence than any other (Little and Krannich 1987c). This was probably due to the fact that many of the first agriculturalists were Mormons.

As a result of its diverse population, Pahrump offered many opportunities for both formal and informal interaction (e.g., Boy and Girl Scouts, Lions Club, and several church



organizations) (see Trend et al. 1987c). One particular group that had become involved in local organizations and activities was the senior citizens. As noted above, there had been a recent in-migration of retirees to the area. Combined with the existing aging population, there was thus a large senior citizen population. These seniors were actively represented in community and national associations, such as the American Association of Retired Persons (Trend et al. 1987c).

Initial baseline community interviews suggested that unlike Amargosa Valley, there was little sense of community among residents of Pahrump. This may have been due to the geographical dispersion of residences and commercial businesses, as well as to increased diversity of lifestyles and values accompanying the in-migration of new residents (Little and Krannich 1987c; Trend et al. 1988c).

#### *Caliente*<sup>42</sup>

Caliente is located in eastern Lincoln County. It is 127 air miles and 253 road miles from the proposed Yucca Mountain repository.<sup>43</sup> Because of its distance to Yucca Mountain, it is not likely to directly benefit economically

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<sup>42</sup>This is the same community described by Fred Cotrell's (1951) classic article *"Death by Dieselization: A Case Study in the Reaction to Technological Change."*

<sup>43</sup>Caliente was among the "downwind" communities affected by radioactive fallout from atmospheric nuclear testing conducted at the Nevada Test Site.

from the proposed Yucca Mountain facility. However, because Caliente is bisected by two potential transportation corridors for the nuclear waste -- the Union Pacific Railroad mainline between Salt Lake City and Las Vegas, and U.S. Highway 93 -- residents could experience some economic and community impacts from waste transportation.

Caliente was originally an agricultural town and service area to nearby mining towns, e.g., Pioche. However, the construction of the railroad at the turn of the century transformed the area into a major transportation center, serving as a division point for the Union Pacific Railroad. Yet, by the late 1940s, the replacement of steam engines with diesel locomotives, which required fewer repairs, led to the loss of jobs and widespread outmigration of people economically dependent upon the railroad. The loss of railroad jobs, combined with declining agricultural and mining activities in the region during the 1970s and 1980s, resulted in a community that has experienced economic decline over the past few decades (see Endter et al. 1988a; Krannich and Little 1987a). The population at the time of the study was estimated at 980.

During the study period, the economic base of Caliente was more diverse than in its early days when it had a heavy reliance on the railroad. Government-related employment

(e.g., county school district, road department, Bureau of Land Management area office, NTS, and the Nevada Girls's Training Center) sustained the economy of the community. A few service-sector businesses also provided jobs for area residents. In addition to serving the existing population, these businesses catered to tourists visiting the state parks (e.g., Echo Canyon) and recreation areas within Lincoln County. However, the completion of State Route 318 reduced traffic through the area, thereby eliminating nearly three-fourths of the area's business (see Endter et al. 1988a; Krannich and Little 1987a). Many residents perceived the community as economically depressed, and were therefore supportive of an assortment of proposed projects. Some residents seemed to be ". . . in favor of bringing virtually any form of new business or industry into the community" (Krannich and Little 1987a:27). The economic viability of Caliente remains a central concern for area residents.

The importance of the railroad has declined over the years, yet the impact of the railroad on the cultural history of the area is evident. The depot still serves as a focal point for the community, with city offices and library occupying its rooms. Further evidence of the railroad's influence included "[r]ows of railroad-era housing, much of it in disrepair . . ." (Krannich and Little 1987a:18). Commercial areas can still be found on

either side of the railroad tracks; however many facilities were boarded up, symbolizing the economic downturns experienced by the town (Krannich and Little 1987a).

Although the physical aspects of the town suggested a stagnant economy, there appeared to be ample opportunities for residents to get involved in community activities and interact with one another (e.g, church organizations, recreational outlets, volunteer fire department). The predominant religious organization at the time was the Church of Jesus Christ of Latter-Day-Saints (Mormons), which served as an important component of the local social structure (Krannich and Little 1987a). The Mormons sponsored activities (e.g., socials) and provided a framework of support for its members. Because of its strong influence, however, there was occasional conflict between the Mormons and non-Mormons (see Endter et al. 1988a). Caliente's railroad history included the immigration of a more heterogeneous population than the nearby town of Panaca, which evolved as a Mormon agricultural village.

Another relatively large and active group of residents consisted of the senior citizen population. This group included some elderly persons who had retired to the area, as well as retirees from the railroad.

Although there were several formal avenues for people to become involved in the community and interact with one

another, there was not a lot of public participation among Caliente residents (Krannich and Little 1987a). This may be due, in part, to the cultural heterogeneity of the population, indicating fewer shared values and norms than would be expected from a more homogenous group (Krannich and Little 1987a). Initial baseline interviews with Caliente residents revealed that most people preferred to interact on an informal basis (see Krannich and Little 1987a). Nevertheless, within the informal social structure, residents exhibited a strong sense of community solidarity, with residents indicating that if they had a problem, any number of people would be willing to help them out (Krannich and Little 1987a).

### *Mesquite*

Mesquite is located in northeastern Clark County along Interstate Route 15 near the Utah and Arizona borders.<sup>44</sup> Because of its distance from Yucca Mountain (142 air and 184 highway miles), it is not likely that residents in this town will directly benefit economically from the proposed repository. However, just as in Caliente, the community is bisected by a major highway (Interstate 15), which is a likely transportation route to Yucca Mountain. Thus,

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<sup>44</sup>Like Caliente, Mesquite is considered a "downwind" community and was severely affected by radioactive fallout during the era of atmospheric nuclear testing in the 1950s and early 1960s (see Fuller 1984).

residents could experience some economic and community impacts from the transportation of high-level nuclear waste.

The community was originally settled by members of the Mormon Church and existed for many years as an agricultural village. Unlike other study communities in southern Nevada, Mesquite's early history did not include the economic and social instability that typically accompanies mining booms and busts.

During the 1980s the economic structure of the area expanded from primarily agriculture to include the construction and operation of a large casino and resort complex. The new resort complex stimulated rapid growth in the area (Krannich and Little 1987c). The population at the time of the study was approximately 1580. The current population relies heavily on the casino and resort complex for employment. Service sector businesses, which employ local residents and cater to tourists and travelers along Interstate 15, supplement the economic base provided by agriculture and the casino complex.

In addition to the population growth due to the construction of the casino complex, there was a small, but growing "snowbird" population, i.e., retirees who migrated to the area during the winter months. The transiency of this group produced little cohesion or active participation in community affairs (Krannich and Little 1987c).

Because of its development as a Mormon settlement, with church headquarters in Salt Lake City, Utah, many residents identified with Utah rather than Nevada. The Utah influence was enhanced by the fact that the nearest urban center is St. George, Utah. Many residents traveled to St. George to meet their medical and shopping needs. Such an alliance has created a resentment between eastern Clark County residents and Clark County government. The former believe Clark County officials were concerned only with Las Vegas and its problems (see Krannich and Little 1987c).

Although the influx of new migrants during the 1980s brought a somewhat more heterogeneous population to the area, the Mormon church appeared to dominate many formal and informal activities (see Krannich and Little 1987c). It was not surprising to find that some tension existed between non-Mormons and Mormons. Similarly, there was some tension between the "newcomers" and the "oldtimers." This tension makes community cohesion across the various groups tenuous. Overall, there appeared to be more community solidarity among the Mormons and oldtimers than among non-Mormons and newcomers (Krannich and Little 1987c).



## CHAPTER V

### PROCEDURES

This chapter describes the procedures used to meet the objectives discussed in Chapter III.<sup>45</sup> The first part of the chapter describes the research procedures, including information regarding the population, sample design, and data collection methods. The remainder of the chapter is devoted to the operationalization of the concepts described in the theory sketch.

#### *Research design*

##### *Population, sample frame and sample*

As noted in Chapter IV, this study focuses on six rural southern Nevada communities (Amargosa Valley, Beatty, Pahrump, Indian Springs, Mesquite, and Caliente). These communities were selected for their proximity to the proposed site of the high-level nuclear waste repository at Yucca Mountain. Furthermore, all six communities are situated near likely transportation corridors leading to the repository.

Within each study community, comprehensive sampling frames were developed using community electric utility and/or water records. To ensure the inclusion of each

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<sup>45</sup>The data analyzed here represent only a small portion of the available data collected by members of the Yucca Mountain Socioeconomic team. The project was supported by the Nevada Nuclear Waste Projects Office.

residence in the sampling frame, supplemental on-site visual enumeration of each household was performed.<sup>46</sup> Upon completion of the sampling frame, each household was assigned a number, and households were selected using computer-generated random numbers. Thus, a simple random sample of households was selected for each community.

#### *Data collection*

This study used a complex multifaceted triangulation design incorporating both qualitative and quantitative data. Data collection consisted of three components.<sup>47</sup> The first component involved developing community profiles from available secondary data and key informant interviews. These interviews involved semi-structured, face-to-face conversations with local officials, community leaders, and others knowledgeable about local conditions. Interviews were conducted during 1986 and 1987 (see Krannich and Little 1987a, 1987b, 1987c; Little and Krannich 1987a, 1987b, 1987c).

The second component of data collection involved in-depth community ethnographic studies. Participant observation and ethnographic interviews were conducted by two full-time researchers residing in the study area for a

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<sup>46</sup>In Indian Springs only on-site enumeration was used.

<sup>47</sup>The first component was undertaken prior to the other two. Components one and two were ongoing throughout the entire study project.

9-month period extending from late 1987 through mid-1988 (see Endter et al. 1988a, 1988b; Trend et al. 1988a, 1988b, 1988c).

The third component of data collection involved the use of a questionnaire. Information obtained from the key informant interviews, ethnographies, and secondary data was used as a basis for constructing survey questions. The survey instrument includes numerous questions drawn from the social science literature, from the ethnographic studies, and from key informant interviews undertaken by the team (see Appendix). The questions included a wide array of community issues. The resultant standardized questionnaires were distributed to the randomly selected samples of adult residents within each study community. Before questionnaire distribution, two separate pretests of the questionnaire were conducted and appropriate changes made.

In each study community, two field workers utilized a personalized drop-off/pick-up technique (see Krannich et al. 1985) to collect data in March, April, and May, 1988.<sup>48</sup> For each household randomly selected, field workers identified the household member 18 years or older whose birthday had occurred most recently. This selection criterion provided each adult in the household with an

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<sup>48</sup>The author was a field worker in the communities of Amargosa Valley, Beatty and Pahrump.

equal chance of being selected, thus maintaining the randomness initiated with the household selection. Upon identification, cooperation was obtained from the potential respondent.<sup>49</sup> Each cooperating respondent was given a questionnaire and informed that the field worker would return to pick up the completed questionnaire in a day or two (whichever was more convenient for the respondent).<sup>50</sup> This technique resulted in an overall response rate of over 80 percent (see Table 1).

### *Operationalization of concepts<sup>51</sup>*

The primary issue of interest to this study centers on the concept of quality of life. Since the quality of life concept is multidimensional (Hunter 1975; St. John et al. 1986) and can mean different things to different people, it would be impossible to predict which aspects of quality of life would be important to area residents. Fortunately, information obtained from ethnographic research revealed aspects of community and individual characteristics that were important or salient to area residents. Therefore,

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<sup>49</sup>If the potential respondent was not home, the field worker made arrangements to return at a later time to personally contact the respondent.

<sup>50</sup>In a few cases, respondents were unable to complete the questionnaire during the field work period. When this occurred, self-addressed, postage-paid envelopes were left with the respondent.

<sup>51</sup>The number provided by each question corresponds to the question number on the survey instrument.

Table 1. Sample size and response rates for rural Nevada community surveys

Community	Number Delivered	Number Completed	Response Rate
Beatty	150	111	74.0%
Amargosa Valley	123	104	84.6%
Pahrump	220	189	85.9%
Indian Springs	152	122	80.3%
Mesquite	152	110	72.3%
Caliente	152	131	86.2%
Combined Communities	949	767	80.8%

the ethnographic information, along with items that consistently show up as important indicators of quality of life in the literature, were included in the rural Nevada survey instrument.

The questions used for this analysis pertain to (1) current perceptions of one's self and community, (2) future quality of life aspirations, (3) changes anticipated due to the repository, and (4) support/opposition for the proposed repository.

#### *Current perceptions of one's self and community*

The theory sketch guiding this analysis suggests that it is important to assess current perceptions of one's self and community. To accomplish this assessment residents

were queried about current levels of satisfaction with aspects of the community and economy, as well as levels of community attachment.

*Community satisfaction.* Research suggests that community satisfaction plays a key role in perceived quality of life (Hughey and Bardo 1987). Perceptions of community satisfaction are needed:

- (1) to discover how residents perceive their community, (2) to discover how they think it will change with the proposed project, and (3) to obtain community perceptions about some objective indicators (Branch et al. 1984:117-18).

To measure the general sense of satisfaction, respondents were initially asked about their overall satisfaction with their community as a place to live. More specifically, respondents were asked:<sup>52</sup>

11. Using a scale from 0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED), how satisfied are you OVERALL with this community as a place to live?

Although overall community satisfaction attempts to get at the broad community picture, there may be specific aspects of community satisfaction that are perceived by residents as more satisfactory than others. One important aspect of community satisfaction is satisfaction with community services (e.g., Campbell et al. 1976). Rogers (1982:148) suggests more "[r]esearch is needed on the role

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<sup>52</sup>Numbers to the left of each question refer to original questionnaire items.

that satisfaction with services plays in determining community satisfaction." Thus, a second set of indicators addressing satisfaction with a variety of community services and amenities was used. Respondents indicated their level of satisfaction with a series of twenty items pertaining to a variety of topics.<sup>53</sup> The specific questions were:

12. Using the same scale from 0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED), how would you rate this community on each of the items listed below? CIRCLE a number between 0 and 10 that best indicates your opinion.
  - a. As a place to raise a family
  - b. Quality of medical and health services
  - c. Quality of the local schools
  - d. Friendliness of the people
  - e. Availability of good jobs
  - f. Opportunity to earn an adequate income
  - g. Availability of suitable housing
  - h. Adequacy of law enforcement
  - i. Physical condition of streets and roads
  - j. Overall effectiveness of local government
  - k. Availability of senior citizen's programs
  - l. Availability of youth programs
  - m. Adequacy of local shopping facilities
  - n. Local tax rates
  - o. Power/electric rates
  - p. Public water and/or sewer services
  - q. Garbage collection services
  - r. Telephone services
  - s. Fire protection services
  - t. Recreation facilities and programs

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<sup>53</sup>The items pertain to public service satisfaction (e.g., garbage collection, law enforcement, fire protection and telephone services), satisfaction with medical and education services, satisfaction with opportunities to work and earn an adequate income, and satisfaction with social amenities of the community (e.g., friendliness of the people).



Responses to these twenty items will be used in developing summed indices for comparison across communities.<sup>54</sup>

*Economic satisfaction.* An additional measure of community satisfaction is represented by a question on perceived economic satisfaction. Recent studies on siting large-scale facilities in rural areas found that when employment and income opportunities are lacking or unsatisfactory, residents tend to be in favor of new projects (Bourke 1991; Krannich and Luloff 1991).

Economic satisfaction is operationalized using three questions. The first question specifically asked respondents about their satisfaction with their own economic situation:

19. Using the same scale [0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED)], overall how satisfied are you with your economic situation these days?

Two additional questions on economic satisfaction are taken from the previous satisfaction series (questions #12e and 12f): satisfaction with the availability of good jobs and satisfaction with the opportunity to earn an adequate income. These two questions will be used independently and as a summed index to assess economic satisfaction.

*Community attachment.* Community attachment is also a

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<sup>54</sup>Cronbach's alpha will be run on these items to assess internal consistency and reliability. A factor analysis will be performed. The factors (or underlying dimensions) that emerge from this analysis will then be used in further analyses.

factor identified as an important contributor to overall quality of life (Goudy 1990). Previous studies have found that those residents who have an attachment to the community and/or its residents (i.e., family or friends in the area) are more critical of and concerned over potential changes to the area than residents who are not attached to the area (Brown 1988; St. John et al. 1986).

Community attachment has been operationalized several ways in the literature. As noted by Gerson et al. (1977:156), "[a]ttachment to place is not holistic but multidimensional. There are different ways of being attached, ways that are not strongly related to one another. Different types of people are attached in different ways." For example, Goudy (1990) included measures of social bonds (e.g., friends and people known, and organizational membership), and local sentiment (e.g., feeling at home in a community). Brown et al. (1989) used the variable "plans to move" as an indicator of community attachment. In their view, Krannich and Little (1989:20) suggest ". . . geographic mobility may be a factor, since residents who anticipate moving away from the area may believe that they will not be exposed to any of the long-term risks associated with repository operation."

Measures of residential stability have also been used as aspects of attachment to an area or community (Hunter 1982; Stanley and Rattray 1978). Likewise, Sampson (1988)

used local friendship ties, individual attachment, home ownership, and length of residence as measures of residential stability.

In this study, three items are used as measures of community attachment. The first measure consists of determining the proportion of close friends residing in the community and incorporates Goudy's (1990) notion of social bonds. This index is obtained by dividing each respondents' answer to question six (total number of friends) with their response to question five (number friends residing in town).<sup>55</sup> These two questions were:

5. How many individuals do you consider to be really close friends of yours, that is, people you can confide in?
6. How many of these really close friends live in **this** community?

The second measure of community attachment ascertains plans to remain in the community over the next five years. The question used was:<sup>56</sup>

13. Do you have any plans to move away from this community in the next five or so years?

The third measure of community attachment is an index of questions addressing the importance of local sentiments. The items included in this list were similar to those used

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<sup>55</sup>This process normalizes the responses from residents of different-sized communities.

<sup>56</sup>Response categories were (a) definitely will not move, (b) probably will not move, (c) probably will move, and (d) definitely will move.

in previous studies (Eliason 1992; Goudy 1990). They were:<sup>57</sup>

10. On a scale of 0 (COMPLETELY DISAGREE) to 10 (COMPLETELY AGREE), please indicate how you feel about each of the following statements.
  - a. The longer I live in this town, the more I feel I belong here.
  - b. The town in which I live is basically a friendly place.
  - c. I feel fully accepted as a member of this community.
  - d. If I was in trouble, many people in this community would go out of their way to help me.
  - e. Most people in this community can be trusted.

#### *Future quality of life aspirations*

In addition to existing quality of life perceptions, as described in the previous section, the theory sketch posits that residents have aspirations or goals they would like to see their community attain. Respondents were asked a series of questions regarding future quality of life aspirations. Specifically, respondents were asked:<sup>58</sup>

17. On a scale of 0 [Not at All Important] to 10 [Extremely Important], please indicate **how important** you think each of the following things is for maintaining and improving the future quality of life in your community.
  - a. Preserving existing ways of life and values
  - b. Increasing economic opportunities for local residents

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<sup>57</sup>See footnote 54.

<sup>58</sup>See footnote 54.

- c. Maintaining an unpolluted environment with clean air and water
- d. Improving public services such as schools, road maintenance, and police protection
- e. Increasing the community's ability to influence state and federal decisions that affect local residents
- f. Limiting population growth

### *Anticipated change*

The theoretical sketch described in Chapter III implies that when a proposed action is put forth, residents reassess their future community and individual aspirations in light of potential changes due to the proposed action. Furthermore, such outcomes influence respondents' decision to support/oppose the proposed repository. Therefore, it is not enough to assess current and future levels of quality of life. It is also necessary to determine the extent to which residents anticipate change(s) due to the proposed action.

The types of anticipated change will vary depending upon the nature and size of the proposed project. In their review of studies on attitudes and beliefs about nuclear power plants, Lounsbury et al. (1983:226) noted

. . . that residents' beliefs about the likelihood of hazards to health and to the environment as well as the anticipated economic benefits of growth have a significant and fairly long-lasting effect in accounting for a person's attitude toward a nuclear power plant.

Given that the proposed Yucca Mountain project, like a nuclear power plant, is both large and nuclear, it may

reasonably be anticipated that residents in this study are likely to anticipate similar changes.

Five questions were selected to operationalize various aspects of anticipated change resulting from the proposed repository. The five questions include two pertaining to overall benefits/harms, two assessing future risks to health, and one on anticipated impacts to the economy:<sup>59</sup>

53. Generally speaking, do you think that the nuclear waste repository would have entirely harmful effects on **this community**, that the effects on the community would be entirely beneficial, or that beneficial and harmful effects would balance each other?
54. Generally speaking, do you think that the nuclear waste repository would have entirely harmful effects on **you personally**, that the effects on you would be entirely beneficial, or that beneficial and harmful effects would balance each other?
55. If the repository is built at Yucca Mountain, how concerned are you that it might have harmful effects on public health and safety in **THIS AREA**?
56. How concerned are you that nuclear radiation would not be confined to the repository and might contaminate underground water supplies?
57. How do you think the repository would affect the economic well-being of residents or businesses in this area?

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<sup>59</sup>The response options for questions #53, #54, and #57 were on a scale from 0 (ENTIRELY HARMFUL EFFECTS) to 10 (ENTIRELY BENEFICIAL EFFECTS), with 5 representing EQUAL BENEFITS AND HARMFUL EFFECTS. The response options for questions #55 and #56 were on a scale from 0 (NOT AT ALL CONCERNED) to 10 (EXTREMELY CONCERNED).

*Support/oppose repository*

Finally, the theory sketch suggests that residents' perceptions of current and future levels of quality of life, along with information on the proposed repository, will lead to the anticipation of changes. Based on these anticipated changes, residents will either support or oppose the repository. Therefore, the decision to support or oppose the proposed repository is the key dependent variable under consideration. Since support or opposition to the proposed Yucca Mountain repository had not been formally addressed by federal or state agencies, a question, addressing this concern was included on the questionnaire. The question asked each respondent:<sup>60</sup>

59. If you were able to make the final decision regarding the location of the nuclear waste repository at Yucca Mountain, would you build it there?

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<sup>60</sup>Response options for this questions were: (a) DEFINITELY YES, (b) PROBABLY YES, (c) UNCERTAIN, (d) PROBABLY NO, (e) DEFINITELY NO.



## CHAPTER VI

### ANALYSIS AND RESULTS

This chapter describes the results of the empirical analysis of data collected from representative samples of rural residents from the six southern Nevada communities. As a way of organizing the results, the chapter is divided into four sections. The first section describes the demographic characteristics of respondents in the study communities. The second section provides a univariate analysis of the variables operationalized in the previous chapter. Information obtained from this analysis addresses the first five hypotheses ( $H_1$  to  $H_5$ ) and includes descriptive data on: (1) current perceptions of quality of life, using satisfaction and attachment indicators; and (2) future quality of life aspirations.

The third section of this chapter provides the multiple variable analysis of data associated with the remaining six hypotheses ( $H_6$  to  $H_7$ ). Specifically, the information provided in this section includes an examination of the relationships between the univariate findings in section two and respondents' willingness to support/oppose the repository. The fourth section is an empirical test of the theoretical model presented in Chapter III.

### *Demographic characteristics*

In addition to the narration on the study communities given in Chapter V, this section presents some of the demographic data by which one can analyze and compare the communities. The major demographic results are included in Table 2. The demographic variables included are those that are necessary for comprehending the results in the sections that follow.

#### *Age*

For most of the communities, there is substantively little difference in the average age of the respondents (see Table 2). One exception is for respondents from Pahrump where the average age ( $\bar{X} = 52.4$ ) is five years greater than the next highest average age, which is for respondents from Caliente ( $\bar{X} = 47.4$ ). Although substantively, there is little difference across average age of respondents, a one-way analysis of variance (ANOVA)<sup>61</sup> comparing the means across the study communities indicates statistical differences. A subsequent Fisher's least significant difference (LSD) multiple range test shows respondents in Pahrump are significantly different from

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<sup>61</sup>Throughout the analyses, ANOVA and LSD procedures are discussed whenever the statistical differences enhance some point. Results are statistically significant at  $p < .05$ . In some instances, LSD matrixes are provided and ANOVA results are given.

Table 2. Selected demographic information by study community

Category	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
Age							
Mean (yrs.)	46.6	45.2	43.2	52.4	47.4	44.4	47.0
Median (yrs.)	46.0	40.5	42.5	55.5	40.5	40.0	45.0
65 and Over (%)	8.5	16.7	4.9	23.1	24.5	16.8	16.5
Employment							
Retired (%)	16.3	16.0	14.3	38.4	32.2	22.3	24.9
Length of Residence							
Mean (yrs.)	14.8	15.1	17.8	11.1	26.4	28.2	12.8
Median (yrs.)	10.0	7.5	8.0	6.0	15.0	18.5	8.0
Gender (% male)	57.9	56.2	59.0	52.5	55.3	45.9	54.3
Ethnicity (% anglo)	96.7	94.2	93.4	97.6	94.9	95.1	95.5
Education (% ≤ H.S.)	50.0	38.3	41.1	54.2	57.3	54.9	49.8
Religion (%) Mormon	2.1	11.7	11.9	7.1	29.3	73.8	21.4
Marital Status							
Living with Spouse/Partner(%)	72.0	67.9	73.0	69.6	62.7	72.3	69.5
Median Annual 1987 Household Income	31,413	22,827	30,809	23,619	18,811	20,778	25,149
Resided in the Area During Above-Ground Testing	23.2	25.2	17.8	12.4	47.4	58.3	28.7

respondents in all other study communities ( $P < .05$ ).<sup>62</sup>

Furthermore, the LSD test indicates that there are no other pairs of community respondents that are significantly different with respect to mean age.

Reflective of the relatively high mean ages, nearly one-fourth of both Caliente and Pahrump respondents are age 65 and over, while the rest of the communities have less than 17% in that category. The mean age of Pahrump residents is partially due to efforts to market the area as a retirement community (Trend et al. 1988c). Similarly, Caliente has experienced an aging population, in part because of railroad employees who have reached retirement age. Too, some in-migrants have retired to the area (see Krannich and Little 1987c).<sup>63</sup>

### *Employment*

The assertion that Pahrump and Caliente's 65 and over population is indicative of retirement-oriented communities is supported by examining responses to current employment status. Over 38% of Pahrump and 32.2% of Caliente

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<sup>62</sup>The LSD procedure was chosen because it specifically allows for pairwise comparisons across groups of varying size (SPSS 1975).

<sup>63</sup>Although the other study communities have also experienced an increase in residents over age 65, the rate in Caliente is greater. For instance, over a 40-year period between 1940 and 1980, this age group in Beatty actually decreased by almost 3%. In Caliente, however, for the same time period this age group increased by over 11% (see Krannich and Little 1987c, Little and Krannich 1987b).

respondents are retirees (see Table 2). In contrast, less than 20% of respondents in Amargosa Valley, Beatty and Indian Springs are retired, with Indian Springs having only 14.3% of the population retired. The results from Indian Springs are not surprising. The ethnographic data for Indian Springs suggests that the primary source of employment rests with federally funded projects, suggesting an active work force (see Endter et al. 1988b). Indian Springs, Beatty, and Amargosa Valley have relatively few retired persons when compared to Caliente and Pahrump. Although all communities provide basic services for the elderly, Pahrump has a well-established infrastructure designed to support retired persons and offers activities and other amenities desired by retirees.

#### *Length of residence*

By examining the average length of residence in each study community, Pahrump respondents again stand out as different from residents of the other study communities (see Table 2). Although Pahrump residents indicate the highest average age, they indicate the lowest average length of residence ( $\bar{X} = 11.1$ ). These findings support the idea that many residents of Pahrump are retirees who have recently moved into the area. In contrast, respondents in Caliente and Mesquite have lived in their communities the longest (mean years of residence are 26.4 and 28.2,

respectively).<sup>64</sup> This longer average period of residence in the community suggests greater population stability and less mobility than that observed in the other study communities. Given the history of Mormon settlement for Caliente and Mesquite, with its emphasis on permanent settlement, this finding is not surprising.

There is little variation among Amargosa Valley, Beatty, and Indian Springs respondents as to average length of residence. However, average length of residence for these three communities is much lower than for Caliente and Mesquite, nearly 50% lower. The moderate length of residence for respondents in these three communities likely represents population fluctuations associated with the growth and decline of mining and military employment.

#### *Gender*

For most communities, the majority of respondents were male. The exception is Mesquite, where only 45.9% of the respondents were male (see Table 2). Our sample selection criteria ensured that each household (and each adult within the household) had an equal chance of being selected.<sup>65</sup>

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<sup>64</sup>ANOVA and subsequent LSD procedures indicate that Caliente and Mesquite responses are statistically different from the other four study communities. In addition, Pahrump responses are statistically different from Indian Springs.

<sup>65</sup>Although a specified adult male or female was scientifically selected to fill out the questionnaire, there is no way of verifying who actually filled out the

Therefore, these numbers likely reflect the actual gender distribution of the population in these communities during the study period.<sup>66</sup>

Information obtained from ethnographic data offers some explanation of the gender differences found in the study communities. Ethnographic data indicate that many government-employed residents live in the study communities during the week, while their families live in the Las Vegas area (e.g., Amargosa Valley, Beatty, Indian Springs) (see Endter et al. 1988b; Trend et al. 1988a, 1988b). By assuming most of these workers are male, they would be the only members of their household to meet the selection criteria.

### *Ethnicity*

Residents from each community were overwhelmingly Anglo (see Table 2). This information is supported by findings in the ethnographic reports where little evidence of ethnic diversity is present (see Endter et al. 1988a, 1988b; Trend et al. 1988a, 1988b, 1988c). Thus the study

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instrument once the field worker left the residence.

<sup>66</sup>A comparison with the 1990 census for these communities indicates similarities (e.g., male respondents in Beatty = 56.2%, census data for Beatty = 57% male) and differences (e.g., male respondents in Indian Springs = 59%, census data for Indian Springs = 51% male). However, it should be noted that the available census data included all household members, not simply those over 18 years of age.



sites reflect a great deal of racial homogeneity.

### *Education*

For most study communities, nearly half the respondents had a high school-level education or less (see Table 2). However, for respondents in Beatty, less than 40% had no more than a high school diploma. Similarly, only 41.1% of Indian Springs respondents had only as much as a high school education. Insofar as residents of these two communities are employed in government-related activities, this probably reflects the fact that government employment, by and large, requires higher education levels.

In contrast, data from Caliente and Mesquite, where residents tend to be older and retired, indicate that well over half have no more than a high-school diploma (57.3% and 54.9%, respectively). This reflects the educational options available to the older generations. Similarly, residents of Pahrump had a large segment of retired persons. Furthermore, Pahrump is primarily a service-oriented community where current employment may not require more than a high school diploma.

### *Religion*

There is an obvious and expected difference in religious affiliation between Caliente and Mesquite and the remaining study communities (see Table 2). As noted earlier, Caliente and Mesquite were settled by members of

the Mormon church, so the high percentage of respondents indicating this preference is not surprising (29.3% and 73.8%, respectively). Although Caliente's Mormon population is considerably less than Mesquite's, it is nonetheless more than twice the proportion found in the other study communities. This suggests a higher degree of homogeneity of values and beliefs than in the other study communities. Clearly, Mesquite's strong attachment to Mormonism suggests a large degree of cultural homogeneity.

#### *Marital status*

The majority of respondents in each study community are currently either married or living with a partner (see Table 2). This is not unlike other rural communities in the United States, and may be due to the fact that young, unmarried adults often leave the area as soon as they are of age. The outmigration of young adults also suggests that small towns do not offer sufficient activities attractive to single people. Rather than live in a small town, even if jobs were available, single people may opt to live in metropolitan centers like Las Vegas, where there are alternative forms of entertainment and social activities for singles. Ethnographic interviews revealed this to be a concern of local residents (Endter et al. 1988a, 1988b; Trend et al. 1988a, 1988b). A common theme in the ethnographic interviews was a desire for an economic source of stability for the community that would allow

young people to remain in the area.

Alternatively, married persons or people living with their partners may prefer to live in small towns, especially if children are present. This is evident in ethnographic interviews in which it was not uncommon for respondents to comment that their community is a great place to raise a family (Endter et al. 1988a, 1988b; Trend et al. 1988a, 1988b; Krannich and Little 1987a).

#### *Household income*

Residents in the communities of Caliente and Mesquite report the lowest average household income (\$18,811 and \$20,778, respectively) (see Table 2). In contrast, residents in Indian Springs and Amargosa Valley had the highest, nearly 50% higher (\$30,809 and \$31,413, respectively). The lower incomes exhibited by respondents in Mesquite likely reflect the reliance of these communities on the service-sector economy, which tend to pay lower wages than do government jobs. For respondents in both Caliente and Pahrump, the relatively low average income may also reflect the relatively large retirement population within these areas.

#### *Residence during atmospheric weapons testing*

As noted in Chapter IV, Nevada has a long history of playing host to federal projects. Of particular interest to this study is past activities at the Nevada Test Site

(NTS), which occupies the federal land adjacent to the Yucca Mountain site and the study communities. An important part of NTS's history is from the era of above-ground testing (1950s and early 1960s). This period spawned a good deal of controversy regarding the negative health/safety effects of above-ground tests, especially from residents of those communities downwind of NTS. As seen in Table 2, 47.4 and 58.3% of the residents of Caliente and Mesquite, respectively, lived in the area during atmospheric testing. These residents were thus downwind of the fallout and likely experienced direct or indirect negative effects.

In contrast, the other four study communities are located upwind from NTS. Here, however, only approximately one-fourth of the residents of Amargosa Valley and Beatty (23.2% and 25.2%, respectively) lived in the area during the era of atmospheric weapons testing. Residents of Pahrump indicate the lowest percentage residing in the area during the atmospheric era (12.4%). This is likely due, in part, to the relatively large group of in-migrant retirees. Only 17.8% of Indian Springs residents indicate residing in the area during the atmospheric era.

The impact of living downwind of NTS during above-ground testing may have lingering effects on how residents perceive current and future activities at NTS. Stoffle et al. (1988) suggest that there may be a "risk perception

shadow," wherein residents transfer negative experiences from the past to future analogous projects. Ethnographic and initial baseline data suggest that this is indeed the case with residents of Mesquite and Caliente (see Endter et al. 1988a; Krannich and Little 1987b, 1987c). For instance, Krannich and Little (1987c:25) note that "many local residents appear to be extremely distrustful of the federal government, and are concerned that the waste repository will once again subject them to the risks of radioactive exposure."

In contrast, those communities upwind from NTS during atmospheric testing did not, for the most part, experience the negative health/safety concerns expressed by residents in the downwind communities. Therefore, perceptions and opinions of upwind communities toward existing and future projects may be significantly different from downwind respondents, especially among those who were in residence during the test period.

#### *Univariate analyses (Hypotheses $H_{1a}$ to $H_3$ )*

The primary focus of this dissertation is the relationship between perceived quality of life and project support/opposition. The theory sketch developed in Chapter III to guide the analysis suggests that prior to the introduction of a proposed project residents have perceptions about their way of life and the future

aspirations they hold for themselves and their community. The propositions which follow from this theory sketch suggest four hypotheses relating to current perceptions of quality of life ( $H_{1a}$  to  $H_{2b}$ ).

A further proposition suggests that upon notification of a proposed project, residents anticipate potential changes to their quality of life. Thus, an additional hypothesis ( $H_3$ ) follows. The following discussion restates and empirically tests these five hypotheses.

*Current perceptions of one's self and community*

Current perceptions of one's self and community are operationalized by examining levels of community satisfaction and attachment. Hypotheses to be examined within this section are:

- $H_{1a}$ : Residents in the study communities will display general satisfaction with their quality of life.
- $H_{1b}$ : Residents in the study communities will demonstrate a high overall level of community satisfaction.
- $H_{2a}$ : Residents in the study communities will demonstrate dissatisfaction with their economic situation.
- $H_{2b}$ : Residents in the study communities will demonstrate dissatisfaction with available employment opportunities in the area.
- $H_3$ : Residents in the study communities will anticipate that there will be changes associated with the proposed repository.

These hypotheses are operationalized using four



measures: (1) satisfaction with a list of twenty community amenity items; (2) overall community satisfaction; (3) economic satisfaction; and (4) community attachment.

*Community satisfaction amenity items.* The first measure of community satisfaction deals with a series of 20 items in which respondents indicated their level of satisfaction on a scale of 0 (completely dissatisfied) to 10 (completely satisfied). Responses to the items were analyzed for internal consistency and reliability using Cronbach's alpha coefficient (1951) and are displayed in Table 3. The results for the combined sample yielded a alpha coefficient of .90, indicating the scale is internally reliable.<sup>67</sup>

Satisfaction with the 20 items for the combined sample ranged from a low of  $\bar{X} = 2.67$  for "adequacy of local shopping facilities," which is not unusual for rural areas that are isolated from major metropolitan areas, to  $\bar{X} = 7.83$  for "friendliness of the people." This relative high mean response is followed closely by "community as a place to raise a family" with a mean of 7.67. These findings are supported by the ethnographic data from the individual study communities, where residents often indicated

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<sup>67</sup>Cronbach's coefficient alpha is a measure of internal reliability for a set of items. Statisticians generally strive for alphas of .70 or greater (see Bohrnstedt and Knoke 1982).



Table 3. Mean community satisfaction scores

Satisfaction with the following*:	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
a) community as a place to raise a family	7.83	6.56	7.08	8.13	8.19	7.92	7.67
b) quality of medical & health services	5.06	4.07	2.20	5.45	5.27	5.13	4.62
c) quality of the local schools	5.96	5.79	6.72	6.82	6.71	6.25	6.43
d) friendliness of the people	8.31	7.90	7.31	7.97	7.98	7.48	7.83
e) availability of good jobs	2.31	4.94	3.23	2.63	2.20	3.55	3.08
f) opportunity to earn an adequate income	3.34	5.63	4.34	3.15	2.80	3.56	3.73
g) availability of suitable housing housing	4.54	3.78	4.77	5.12	4.18	3.52	4.40
h) adequacy of law enforcement	7.06	7.16	5.68	6.74	6.28	6.75	6.60
i) physical condition of streets and roads	4.08	5.11	5.07	3.66	2.28	5.20	4.13
j) overall effectiveness of local government	4.77	5.34	4.36	4.82	4.56	5.81	4.92
k) availability of senior citizen's programs	7.16	7.91	7.35	6.93	7.03	6.92	7.19
l) availability of youth programs	3.41	3.42	3.24	4.28	3.27	5.21	3.83

Table 3. Continued.

Satisfaction with the following <sup>a</sup> :	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
m) adequacy of local shopping facilities	1.59	1.78	1.66	3.97	2.83	3.23	2.67
n) local tax rates	4.56	6.60	5.52	7.07	6.25	5.37	6.04
o) power/electric rates	6.07	6.03	5.78	6.61	5.73	6.83	6.21
p) public water and/or sewer services	3.50	6.70	5.98	5.14	6.87	6.17	5.84
q) garbage collection services	5.37	7.65	5.47	6.78	7.28	6.20	6.55
r) telephone services	7.12	7.39	7.31	7.44	7.75	6.93	7.35
s) fire protection services	6.52	8.44	6.27	6.59	8.06	7.21	7.15
t) recreation facilities and programs	3.45	4.10	2.91	5.09	4.24	5.14	4.24
Combined items	5.02	5.81	5.18	5.68	5.41	5.73	5.51
Cronbach's alpha							.90

<sup>a</sup>Items scored on a scale from 0 (completely dissatisfied) to 10 (completely satisfied).

friendliness among residents and felt the community provided a good environment for children and family (e.g., Endter et al. 1988a; Trend et al. 1988a).

The mean for the combined list of items was a modest 5.51 with little substantive variation across communities. However, there is significant variation in the levels of satisfaction for each of the 20 items within communities. When items within the list are examined separately, it is evident that residents are more satisfied with some items (e.g., "friendliness of the people") than with other items (e.g., "adequacy of local shopping"). Overall, there are few substantive differences across the communities. Residents in the six communities responded with relative consistency on each of the 20 items.<sup>68</sup>

Due to the variety of items included in the satisfaction list,<sup>69</sup> a factor analysis was performed using the SPSSx varimax solution on the 20 items to determine what, if any, underlying dimensions existed for these

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<sup>68</sup>Although substantively, there are few differences across communities, when ANOVAs and LSD tests are examined, statistical differences emerge across communities for each of the twenty items. Although there emerged differences on these items, no two communities were consistently different for all twenty items. For instance, for item "a," Beatty and Indian Springs are statistically different from the other four communities. However, for item "i" it is Caliente residents who are statistically different than those in the other communities.

<sup>69</sup>The large number of items included in this list reflects their common use in the literature.

items. The factor analysis allows for a reduction in the number of variables to consider in further analyses. The results of the factor analysis indicate that 56.3% of the total item variance could be explained by four factors with eigenvalues greater than 1.0.<sup>70</sup> The rotated varimax solution for all 20 community amenity items is given in Table 4. To be included within a factor, variables had to have a coefficient (factor loading) of at least .5.<sup>71</sup> The factor loadings indicate how each of the variables correlates with each factor. Four factors emerged from the analysis (see Table 4). For each of the factors a reliability analysis (Cronbach's coefficient alpha) was performed to determine how well the items fit together to form an index. However, there were four items ("g," "h," "j," "k") of the original 20 that did not load highly on any of the factors. They were removed from the list when using clusters of questions or indices in subsequent analyses.

Factor 1 illustrates high factor loadings on six items that are indicative of attitudes about public utilities and

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<sup>70</sup>The decision to choose eigenvalues of one or greater is a standard cutoff point for factor analyses (see Kachigan 1991).

<sup>71</sup>Unlike eigen values, there are no rules of thumb to identify a high factor loading from a low one. It is up to the researcher to examine the loadings within and across the factors and determine a lower bounds for meaningful loadings. Typical lower bounds include .3, .4, or .5 (Kachigan 1991).

Table 4. Rotated factor matrix of community satisfaction items

Satisfaction Items <sup>a</sup>	Factor 1	Factor 2	Factor 3	Factor 4
a) community as a place to raise a family			.83704	
b) quality of medical and health services			.57746	
c) quality of the local schools			.65921	
d) friendliness of the people			.74987	
e) availability of good jobs		.83332		
f) opportunity to earn an adequate income		.81923		
g) availability of suitable housing				
h) adequacy of law enforcement				
i) physical condition of streets and roads		.67128		
j) overall effectiveness of local government				
k) availability of senior citizen's programs				
l) availability of youth programs				.73823
m) adequacy of local shopping facilities				.76170
n) local tax rates	.53636			
o) power/electric rates	.63119			
p) public water and/or sewer services	.73513			
q) garbage collection services	.69529			
r) telephone services	.62557			
s) fire protection services	.64221			
t) recreation facilities and programs				.71216
Cronbach's Alpha	.78	.78	.76	.78

<sup>a</sup>Items "g," "h," "j," and "k" did not load highly on any of the four factors.

services and yielded a Cronbach's alpha of .78. This suggest that these items, when combined, create a reliable index value.

Factor 2 appears to reflect income and job factors (item "e" and "f"); however item "i," road conditions, also loaded highly on this factor. The three items had an alpha of .78. However, the reliability analysis indicated that the alpha level for this factor would be maximized if item "i" were dropped from the index (e.g., from .78 to .88). Theoretically, this makes sense as well, since physical conditions of the streets does not seem to fit with availability of good jobs and opportunity to earn an adequate income.<sup>72</sup> Therefore, in subsequent analyses, this index will consist of only two items ("e" and "f").

Items in factor 3 appear to be a combination of different issues, and do not match theoretical expectations. Items "b" (health services) and "c" (local schools) ought to load with the other "service" items which cluster together on factor 1. Because it does not make theoretical sense to retain these items in the present cluster, both will be dropped from factor 3. Items "a"

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<sup>72</sup>Since many residents commute long distances to work, it is possible that the high factor loading for this item reflects this concern. However, this represents a common measurement problem, e.g., face validity. That is, are we measuring what we think we are? For this question, it cannot be ascertained whether respondents were considering commuting distances when evaluating their responses. Because of this, "i" was omitted from the index.

(community as a place to raise a family) and "d" (friendliness of the people) address specific types of quality of life issues, whereas items "b" and "c" reflect "people-oriented" services.<sup>73</sup> Therefore, for further analyses, factor 3 will consist of only two items ("a" and "d").

Factor 4 consists of three items and yielded an alpha of .78. However, as with factors 2 and 3, it is theoretically questionable whether it is appropriate to use all three items in an index. Item "l" (youth programs) and "t" (recreation programs) appear to be related, while item "m" (shopping facilities) does not make theoretical sense.<sup>74</sup> Thus, for further analyses, this index will consist of only two items ("l" and "t").

Table 5 provides a revised rotated factor analysis of those items that make theoretical sense.<sup>75</sup> The total variance explained by these revised four factors increases

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<sup>73</sup>Although items "b" and "c" did not yield their own factor, a reliability test was conducted to determine if they ought to be treated as an index. The Cronbach's alpha was a modest .54; therefore, these two items were dropped from further analyses.

<sup>74</sup>A theoretical argument might conclude that these three items all provide people with "things to do." However, because each rural community does not offer similar shopping and meeting opportunities, it is difficult to interpret what respondents are responding to.

<sup>75</sup>When this analysis was run, factors 3 and 4 reversed their order in explaining variation. Thus, they are in different columns than the original factor analysis.



Table 5. Revised rotated factor matrix of community satisfaction items

Satisfaction Items <sup>a</sup>	Factor 1 (services)	Factor 2 <sup>b</sup> (job/income)	Factor 3 <sup>c</sup> (youth/rec)	Factor 4 <sup>d</sup> (amicable)
a) community as a place to raise a family				.84738
b) quality of medical and health services				
c) quality of the local schools				
d) friendliness of the people				.83661
e) availability of good jobs		.91413		
f) opportunity to earn an adequate income		.89651		
g) availability of suitable housing				
h) adequacy of law enforcement				
i) physical condition of streets and roads				
j) overall effectiveness of local government				
k) availability of senior citizen's programs				
l) availability of youth programs			.84700	
m) adequacy of local shopping facilities				
n) local tax rates	.52429			
o) power/electric rates	.60293			
p) public water and/or sewer services	.75083			
q) garbage collection services	.74136			
r) telephone services	.63719			
s) fire protection services	.64701			
t) recreation facilities and programs			.76311	
Cronbach's Alpha	.78	.88	.75	.72

<sup>a</sup>Items "g," "h," "j," and "k" did not load highly on any of the four factors.

<sup>b</sup>Item "i" loaded highly (.67128); however, subsequent reliability tests and substantive observation suggest that it be dropped from the factor.

<sup>c</sup>Item "m" loaded highly (.76170); however, subsequent reliability tests and substantive observation suggest that it be dropped from the factor.

<sup>d</sup>Items "b" and "c" loaded highly (.57746 and .65921); however, substantive observation suggests that it be dropped from the factor.

from 56.3% for the original factor model to 66.4% for the revised factor model. In most instances, the factor loadings increased (except items in factor 1). Thus, these are the four factors that are used in subsequent analyses. For each factor an index score is created by taking the respondent's combined scores on each item and dividing the total by the number of items within each factor. This results in a mean score for each respondent on each of the four indices.

Table 6 presents the mean score on each of the satisfaction indices for each of the study communities. For Index 1 (services) and Index 2 (job/income), respondents in Beatty indicate the highest levels of satisfaction. For Index 2 (job/income), respondents from all the study communities indicate relatively low levels of satisfaction, with Beatty residents exhibiting responses near the scale mid-point. This response pattern is also evident in ethnographic interviews wherein residents indicated a need to improve the stability of the local economies.

Satisfaction levels are also relatively low for Index 3 (availability of youth/recreation programs). Only Mesquite respondents indicate responses as high as the scale mid-point ( $\bar{X} = 5.21$ ). The results for Index 3 are also supported by ethnographic interviews which indicate that there is an absence of activities for young people

Table 6. Mean score on satisfaction indices<sup>a</sup>

Community	Index 1 (services)	Index 2 (job/income)	Index 3 (youth/rec)	Index 4 (friendliness)
Amargosa Valley	5.43	2.82	3.37	8.09
Beatty	7.09	5.27	3.73	7.21
Indian Springs	6.09	3.78	3.07	7.21
Pahrump	6.45	2.89	4.64	8.07
Caliente	7.01	2.45	3.76	8.12
Mesquite	6.47	3.53	5.21	7.69
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Combined Communities	6.49	3.40	4.02	7.76

<sup>a</sup>Means for each index are calculated by taking the respondent's combined scores on each item and dividing the total by the number of items within each index. A score of zero would represent a response of completely dissatisfied and a score of 10 would equal a completely satisfied response.

(see Trend et al. 1988a). Finally, responses for Index 4 (friendliness) are near the high level of satisfaction continuum. This too is supported by ethnographic data, in which residents frequently commented on the friendliness of the people.

Beyond the substantive differences noted in Table 6, one-way ANOVAs indicate significant differences across the study communities for each of the four indices. An additional LSD procedure identified the community differences, which are presented in matrix form in Table 7. Significant differences across communities for each factor are identified by a different letter (e.g., "a" = differences for Index 1; "b" = differences for Index 2; "c" = differences for Index 3; and "d" = differences for Index 4). For Index 1 (services), Amargosa Valley is the only community that is significantly different from respondents in all other study communities. The mean of 5.43 is lower than the means for the other communities, indicating less satisfaction with the availability of community services than respondents in the other communities. The remaining indices did not have a consistent pattern of differences across the study communities, suggesting that no one community was invariably dissatisfied with the community amenity items.

*Overall community satisfaction.* In addition to the initial 20 items, respondents rated how satisfied they were

Table 7. Least significant difference among the four satisfaction indices

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	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley						
2. Beatty	abd					
3. Indian Springs	abd	ab				
4. Pahrump	ac	abcd	bcd			
5. Caliente	a	bd	abcd	ac		
6. Mesquite	abc	abc	c	b	abc	

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a = pairs that are statistically different at  $p < .05$  for services (Index 1).

b = pairs that are statistically different at  $p < .05$  for job/income (Index 2).

c = pairs that are statistically different at  $p < .05$  for youth/income (Index 3).

d = pairs that are statistically different at  $p < .05$  for quality of life (Index 4).

Table 8. Mean overall community and economic satisfaction scores

Community	Satisfaction with Your Community as a Place to Live <sup>a</sup>	Satisfaction with Your Current Economic Situation <sup>a</sup>
Amargosa Valley	8.31	6.17
Beatty	7.08	6.71
Indian Springs	6.85	6.26
Pahrump	7.95	6.22
Caliente	7.27	5.75
Mesquite	7.38	6.15
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Combined Communities	7.50	6.20

<sup>a</sup>Items scored on a scale from 0 (completely dissatisfied) to 10 (completely satisfied).

overall with their community as a place to live (see Table 8). The mean response for the combined sample for the question of overall community satisfaction is 7.5 (on a 10-point scale), indicating respondents generally like their community. Furthermore, respondents from all study communities indicate this relatively high level of community satisfaction. The lowest mean is found in Indian Springs ( $\bar{X} = 6.85$ ), which is still significantly above the scale mid-point. The intercommunity differences are generally small with the largest difference between Indian Springs and Amargosa Valley (difference = 1.46, a 13% scale difference). This finding is not surprising given the "motherhood and apple pie" nature of the question. That is, it would be difficult for respondents to indicate anything less than a moderate level of satisfaction (score of 5) without experiencing some cognitive dissonance (see Festinger 1962).<sup>76</sup>

Although respondents from each study community tend to be satisfied with their community as a place to live, a one-way ANOVA yielded statistical differences across the study communities. Table 9 provides the LSD test for

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<sup>76</sup>The social desirability of the question is obvious; however, this issue is pertinent to evaluating resident's overall well-being. To offset the inherent bias in this question, the survey instrument included separate questions pertaining to community amenity items, as well as separate economic questions. All of these questions are used to assess overall satisfaction levels and quality of life for these rural residents.



Table 9. Least significant difference matrix for overall community<sup>a</sup> and economic satisfaction<sup>b</sup>

	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley		a	a		a	a
2. Beatty					b	
3. Indian Springs						
4. Pahrump		a	a		a	
5. Caliente						
6. Mesquite						

<sup>a</sup>Indicates pairs that are statistically different at  $p < .05$  for overall community satisfaction.

<sup>b</sup>Indicates pairs that are statistically different at  $p < .05$  for overall economic satisfaction.

differences between pairs of communities. In general, respondents from Amargosa Valley indicate higher levels of overall satisfaction with their community than found in all other communities.

Ethnographic interviews support the high level of satisfaction among Amargosa Valley residents where, despite the recent outmigration of many residents, the remaining residents enjoyed their way of life (Trend et al. 1988a). Pahrump residents are statistically different from Beatty, Indian Springs, and Caliente. The relatively high levels of satisfaction for Pahrump residents may represent the large proportion of residents affirmatively electing to retire in Pahrump. Theoretically, it makes sense that

people would choose to retire to a community where they would be happy.

The findings for both (1) overall satisfaction and (2) satisfaction with community amenities indicate that residents in these study communities are generally satisfied with their community. Both of these results support hypothesis 1b.

*Economic satisfaction.* In addition to a question on overall community satisfaction, Tables 8 and 9 provide information about respondents' overall satisfaction with their current economic situation. The results indicate mean responses slightly above the satisfaction scale mid-point ( $\bar{X} = 6.2$ ) for personal economic satisfaction. The largest observed difference is between Beatty and Caliente, but this difference is only .96.<sup>77</sup>

The combined community responses for personal economic satisfaction hover slightly above the scale mid-point, and are still slightly higher than expected. Both baseline interviews and ethnographic data suggest that the need for a more stable economy is a key concern for most residents in the study communities (see Endter et al. 1988a, 1988b; Krannich and Little 1987a, 1987b, 1987c; Little and Krannich 1987a, 1987b, 1987c; Trend et al. 1988a, 1988b,

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<sup>77</sup>One-way ANOVAs and subsequent LSD analyses indicate that only one pair of communities, Beatty and Caliente, are statistically different with respect to current economic satisfaction (see Table 9).

1988c). One possible explanation for this finding may be that residents felt satisfied with their *personal* economic situation, yet felt differently about their future economic situation. Another possible explanation is based on cognitive dissonance (see Festinger 1962). According to cognitive dissonance, people often rationalize cognitive inconsistencies. Therefore, in order to rationalize why residents remain in the community, they may be unwilling to admit to being dissatisfied with their personal economic situation.

However, since there is little at stake, personally, residents have no qualms about expressing their dissatisfaction with the community's economy. This is evident from results presented in previous sections. Recall that Index 2 from the 20-item scale consisted of two items, satisfaction with "availability of good jobs" and "opportunity to earn an adequate income." For the combined index of the two, residents from most of the study communities indicated low levels of satisfaction, with mean scores around 3.00, on a 10-point scale. Beatty is the exception where the mean was 5.27. These results suggest a generally low level of economic satisfaction for the community. The neither satisfied nor dissatisfied responses for Beatty residents was likely due to the then recent announcement of a new mine located just outside the community (see Trend et al. 1988b).

The findings are consistent with those of Bourke (1991), where residents in three rural Utah communities exhibited similar patterns of response for these same economic satisfaction indicators. That is, rural residents in the Utah study exhibited modest levels of personal economic satisfaction, but had relatively low levels of satisfaction for the community's economic situation. This finding may reflect two situations. First, some residents actually had good, high-paying jobs. Second, some residents may indicate satisfaction because they are in fact, satisfied. For example, some may find it cheaper to live in rural areas than in urban areas such as Las Vegas.

The present findings do not offer support for hypothesis 2a, which predicted dissatisfaction towards respondent's personal economic situation. However, hypothesis 2b, which predicted dissatisfaction with available employment opportunities in the area, is strongly supported.

*Community attachment.* Measures of community attachment are another common indicator of overall quality of life. Community attachment was operationalized by using three sets of variables: (1) proportion of friends living in the community; (2) plans to move from the area; and (3) a list of items addressing local community sentiments.

The results for the community attachment measures are given in Table 10. The first row of Table 10 provides the

Table 10. Community attachment scores

Attachment Indicator	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
Proportion of Friends (%) <sup>a</sup>	64	67	63	63	70	66	65
Plans to Move (% probably or definitely not)	78	60	45	83	67	73	70
Feelings of Local Sentiment (means) <sup>b</sup>							
a) The longer I live here, the more I belong	8.20	7.22	6.61	7.65	7.41	7.46	7.43
b) The town is a friendly place	8.61	8.33	7.76	8.21	8.28	7.86	8.17
c) Feel fully accepted by others	8.88	7.71	7.70	7.69	7.71	7.33	7.82
d) If in trouble, many people would help	8.11	7.53	7.05	7.04	7.58	7.63	7.43
e) Can trust most others	7.46	6.81	6.53	6.96	7.22	7.18	7.02
Combined item means	8.27	7.50	7.15	7.55	7.66	7.45	7.58
Cronbach's alpha							.90

<sup>a</sup>This value was obtained by dividing the number of friends residing in the community by the total number of friends.

<sup>b</sup>Items scored on a scale from 0 (completely disagree) to 10 (completely agree).

proportion of friends residing in the community. The results indicate that in each of the study communities nearly two-thirds of respondents' friends reside in the same community.

The next question asked respondents if they had any plans to move away from their community in the next five or so years. For the question on plans to move, respondents from most of the communities indicated a propensity not to move. Pahrump residents were the least likely to have plans to move (83%). This is consistent with the fact that many of the residents are retirees who had recently migrated to the area. The exception to this pattern is Indian Springs, where more than half of the respondents (55%) indicated that they would probably or definitely move. This finding is likely due to the fact that residents in Indian Springs rely heavily on government-related employment, and the stability of these government jobs is somewhat questionable given the history of fluctuating NTS employment (see Endter et al. 1988b). A cutback in existing jobs, with few or no new jobs expected for the area, would likely result in an outmigration of current residents. Furthermore, Indian Springs has developed little infrastructure and most economic interactions are made with Las Vegas. Because Las Vegas is only 43 miles away, it becomes a viable residential alternative.

The final measurement of community attachment is a series of questions designed to assess respondents' feelings of local sentiment (see Table 10). The results suggest that respondents in each of the study communities had a relatively high level of agreement for the sentiment items. For each of the five items, respondents from Amargosa Valley indicated the highest agreement rating. Three of the items ("a," "b," and "e") consistently received the least amount of agreement from Indian Springs respondents, although their responses are still well above the scale mid-point. The results for Indian Springs are substantiated by ethnographic and baseline data in which residents indicated some problems with military personnel fitting in with local residents and vice versa.

A factor analysis on these items was done and Cronbach's reliability test run. Results from the factor analysis indicate that the items comprise only one factor. This suggests that these items are addressing a common underlying element. The one resulting factor identified explains 71.4% of the variance in the items. Cronbach's alpha for the items was .90, validating the use of the items as a single factor (see Table 10). From these five items, Index 5 (local sentiments) was created and a mean score for each respondent was calculated (see Table 10). Substantively, there is little variation in responses across communities for the local sentiment index (Index 5),



with a combined mean score of 7.58, suggesting a relatively high level of positive sentiment toward their community and its residents.

A one-way ANOVA and subsequent LSD analysis highlights the statistically significant differences between Amargosa Valley respondents and the respondents from the other communities (see Table 11). There is an absence of statistically significant differences between the other study communities. Initial baseline data and subsequent ethnographic data indicate that as a result of the recent closure of the major employer in the area (ABC), local residents choosing to stay had been brought closer together. For instance, Little and Krannich (1987a:36) found ". . . several individuals indicated that the sense of shared purpose and commonality was coming back again, now that the population of the town had returned to a smaller number . . . ." Therefore, it is not surprising to find the strong feelings of positive local sentiment among Amargosa Valley residents.

The results of the community attachment indicators suggest that residents from these rural communities are significantly attached to their communities. That is, most of their friends reside in the area and they express strong sentiments towards the people and the community. Since both community attachment and community satisfaction are indicators of quality of life, and Hypothesis 1a states

Table 11. Least significant difference matrix for combined feelings of local sentiments (Index 5)

	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley						
2. Beatty	a					
3. Indian Springs	a					
4. Pahrump	a					
5. Caliente	a					
6. Mesquite	a					

a = pairs that are statistically different at  $p < .05$ .

that residents in these study communities will be satisfied with their quality of life, Hypothesis 1a is supported.

#### *Future quality of life aspirations*

In addition to current levels of quality of life, the theory sketch discussed in Chapter III implies that residents also have future aspirations for themselves and their community. To address these issues, residents indicated the importance of six issues pertaining to future quality of life.

Responses to the six items are displayed in Table 12. The mean level of importance for the combined sample on the six items ranged from a low of 4.67 for "limiting population growth" to 8.80 for "maintaining an unpolluted environment with clean air and water." The responses for

Table 12. Mean values for future quality of life aspirations

Importance of the following for maintaining the future quality of life in your community <sup>a</sup>	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
a) preserving existing ways of life	7.06	6.71	6.78	7.58	6.94	7.65	7.15
b) increasing economic opportunities	8.41	8.60	8.11	8.69	8.77	8.63	8.55
c) maintaining an unpolluted environment	8.30	8.57	8.83	9.24	8.78	8.72	8.80
d) improving public services	8.20	8.49	8.53	9.19	8.85	8.82	8.74
e) increasing the community's influence over decisions that affect local residents	8.17	8.33	8.37	8.84	8.31	8.57	8.47
f) limiting population growth	4.44	4.56	4.43	5.41	3.84	4.97	4.67
Combined Items	7.42	7.53	7.42	8.18	7.54	7.84	7.70
Cronbach's alpha							.67

<sup>a</sup>Items scored on a scale from 0 (not at all important) to 10 (extremely important).

"a" through "e" all exceed 7.0, indicating that these items are somewhat important to the future quality of life in the study communities. There appears to be little substantive difference across communities for any of the six questions, suggesting general agreement among rural Nevada residents on the importance of these items for maintaining the future quality of life in their communities.

The average level of importance for the six items is relatively high, both for the combined sample ( $\bar{X} = 7.70$ ) and the individual study communities ( $\bar{X} = 7.42$  to  $\bar{X} = 8.18$ ). However, theoretically these six items appear to be addressing a variety of issues. Cronbach's alpha supports this interpretation, with a modest score of .67.<sup>78</sup> Subsequently, a factor analysis was performed on the six items to see if they are measuring a common underlying theme.

Table 13 provides the results of a rotated factor analysis for these six questions. The factor analysis indicates two separate factors are underlying these items. The alpha level for the first factor is relatively high (.77). These items address aspects of "future change" for the community, whereas items "a" and "f" are more a matter of maintaining the status quo. For factor 2, the alpha is

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<sup>78</sup>Statisticians generally strive for alphas of .70 or greater (see Bohrnstedt and Knoke 1982); therefore, this alpha of .67 is not as high as it should be in order to be confident of the index.

Table 13. Rotated factor matrix of future quality of life aspiration items

Quality of life aspirations	Factor 1	Factor 2
a) preserving existing ways of life		.70379
b) increasing economic opportunities	.75504	
c) maintaining an unpolluted environment	.67952	
d) improving public service	.82091	
e) increasing the community's influence over decisions that affect local residents	.78188	
f) limiting population growth		.86997
Cronbach's alpha	.77	.47

low (.47). Thus, it appears that factor 2, although consisting of two items that load highly ("preserving existing ways of life" and "limiting population growth"), is not an acceptable index. Therefore, for further analytic purposes, future quality of life aspirations will be assessed using three indices: (1) Index 6, a future quality of life index, consisting of items "b," "c," "d," and "f"; (2) item "a," preserve existing ways of life; and (3) item "f," limiting population growth. To obtain a mean score for Index 6 (future quality of life), the respondents' scores on each of the four items were summed and divided by four (the total number of items in the factor).

The mean responses to the three future quality of life measures are given in Table 14. Responses for each variable are consistent across study communities. Respondents from all communities indicate future quality of life (Index 6) is very important with means ranging from 8.27 in Amargosa Valley to 8.99 in Pahrump. The responses for preserving existing ways of life suggest somewhat less importance, although all community mean scores are well above the scale mid-point. In contrast, respondents' views on limiting population growth are less salient, with means tending slightly toward the "unimportant" end of the scale. Caliente residents, in particular, view limiting population growth as relatively unimportant ( $\bar{X} = 3.84$ ). The responses

Table 14. Mean scores for future quality of life items and index

Community	Index 6 <sup>a</sup> (Future QoL)	Preserve Existing Ways of Life	Limit Population Growth
Amargosa Valley	8.27	7.06	4.44
Beatty	8.51	6.71	4.56
Indian Springs	8.43	6.77	4.43
Pahrump	8.99	7.57	5.41
Caliente	8.70	6.94	3.84
Mesquite	8.68	7.65	4.97
-----			
Combined Communities	8.68	7.15	4.67

<sup>a</sup>Means are calculated by taking the respondent's combined scores on each item and dividing the total by the number of index items.



for this last item are likely a result of the perceived need for economic growth, which is usually accompanied by population growth. That is, residents in these study communities likely perceived the benefits of economic growth as more salient than any negative effects of population growth. They were thus willing to put up with one to achieve the other.

While substantively little variation exists across community responses for the future quality of life aspiration items, a subsequent ANOVA and LSD analysis yield several statistically significant differences (see Table 15). For future quality of life (Index 6), Pahrump respondents are statistically different from respondents in Amargosa Valley, Beatty, and Indian Springs. That is, Pahrump residents, more so than the other residents, place the future quality of life in their community as especially important. This is not surprising, given that many of these residents are retired and have recently relocated to the area; they likely chose Pahrump because of the quality of life it offers its residents. Similarly, Pahrump (and Mesquite) residents indicate preserving their way of life as significantly more important than residents of Beatty and Indian Springs. Pahrump residents also differ from the other communities on the importance of limiting population growth. Given the high importance of preserving existing ways of life, it is not surprising that they perceived

Table 15. Least significant difference matrix for future quality of life aspirations

	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley						
2. Beatty						
3. Indian Springs						
4. Pahrump	bc	ac	abc			
5. Caliente	c			b		
6. Mesquite		a	a	b		

a = pairs that are statistically different at  $p < .05$  for preserving existing ways of life.

b = pairs that are statistically different at  $p < .05$  for limiting population growth.

c = pairs that are statistically different at  $p < .05$  for the quality of life Index.

population growth as more negatively affecting their quality of life than residents of the other communities did.

#### *Anticipated changes*

When a proposal, such as the one for the Yucca Mountain repository, is suggested for a given area, local residents will anticipate changes due to the proposed project. Whether these changes are viewed as positive or negative by area residents is the result of the future aspirations they hold for themselves and the community, along with information about the proposed project and its developers. In this study five questions address various types of anticipated change due to the proposed repository. Such changes include anticipated benefits to the community, the respondent, and the economy. Two additional questions address concerns about public health/safety and radiation confinement. Responses are displayed in Table 16.

*Effects on the community.* The first question asked respondents if the effects of the repository would have harmful or beneficial effects for the community. For the combined sample, the result is a mean of 5.27, indicating respondents anticipate a balance between the beneficial and harmful effects. However, across communities substantive differences are evident. The means for Amargosa Valley ( $\bar{X} = 6.69$ ) and Beatty ( $\bar{X} = 6.18$ ) indicate an anticipation of more benefits than harm for the community. These means are

much higher than those reported in Caliente ( $\bar{X} = 4.30$ ) and Mesquite ( $\bar{X} = 3.42$ ). In the latter two communities, responses indicated an anticipation of more harm than benefits for the community (see Table 16). Indian Springs and Pahrump responses were somewhat indeterminate with scores near the scale mid-point ( $\bar{X} = 5.76$  and  $\bar{X} = 5.26$ , respectively). These findings are not surprising given that Amargosa Valley and Beatty (as well as Pahrump and Indian Springs) are in close proximity and well within reasonable commuting distance (e.g., 60 miles) of the Yucca Mountain site. Therefore, it is possible that the more proximate communities anticipate greater benefits from employment opportunities than communities further away.<sup>79</sup>

*Effects on the respondent.* A similar question refers to anticipated repository effects (harmful or beneficial) on the respondent. The pattern of responses to this question is nearly identical to the pattern of the last question (see Table 16). That is, respondents from Amargosa Valley and Beatty anticipated slightly more benefits than harm to themselves from the proposed repository, whereas residents from Caliente and Mesquite anticipated slightly more harm than benefits to themselves. Indian Springs and Pahrump residents provided responses

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<sup>79</sup>Although a separate question specifically addressed anticipated economic effects, it is likely that respondents consider economic effects as part of overall anticipated community effects.

Table 16. Mean score for anticipated changes due to the proposed repository

Anticipated Effect on the:	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
a) Community <sup>a</sup>	6.69	6.18	5.76	5.26	4.30	3.42	5.27
b) Respondent <sup>a</sup>	6.52	6.10	5.43	4.95	4.08	3.47	5.07
c) Public Health <sup>b</sup>	3.58	3.27	4.67	5.61	6.57	6.70	5.15
d) Radiation Confinement <sup>b</sup>	4.65	3.94	5.10	6.72	7.58	7.33	6.00
e) Economy <sup>a</sup>	8.06	7.84	7.27	6.91	5.90	4.84	6.84

<sup>a</sup>Items scored on a scale from 0 (entirely harmful effects) to 10 (entirely beneficial effects, with 5 representing equally beneficial and harmful effects.

<sup>b</sup>Items scored on a scale from 0 (not at all concerned) to 10 (extremely concerned).

near the scale mid-point ( $\bar{X} = 5.43$  and  $\bar{X} = 4.95$ , respectively).

*Effects on public health.* For the combined sample, the level of concern over health and safety effects is near the mid-point, with a mean score of 5.15 (see Table 16). However, across study communities, differences stand out. Specifically, respondents in Amargosa Valley and Beatty exhibit substantially lower concern, with mean scores toward the "unconcerned" end of the scale ( $\bar{X} = 3.58$  and  $\bar{X} = 3.27$ , respectively). On the other hand, responses in Caliente and Mesquite tended toward the "concerned" end of the scale ( $\bar{X} = 6.57$  and  $\bar{X} = 6.70$ , respectively). Again, Indian Springs and Pahrump provided responses near the scale mid-point ( $\bar{X} = 4.67$  and  $\bar{X} = 5.61$ , respectively).

These findings are not surprising given the past and current experiences these communities have had dealing with hazardous/nuclear projects. Caliente and Mesquite are "downwind" communities that experienced radioactive contamination during the era of atmospheric weapons testing at NTS. Therefore, there may be a "risk perception shadow," wherein residents transfer negative perceptions from a past hazardous/nuclear project to a proposed project that also deals with hazardous/nuclear materials. In contrast, the other four communities are considered "upwind" of NTS and have generally not experienced the negative health experiences associated with weapons

testing. Furthermore, many residents of these communities are frequently in contact with activities related to nuclear materials at NTS and perhaps familiarity breeds complacency. Additionally, Beatty residents reside near a low-level nuclear waste facility that most residents appear to view as benign (see Trend et al. 1988b). Therefore, they are less concerned over potential health/safety effects of the repository.

*Concern over radiation confinement.* The next question asked respondents to indicate their level of concern with the repository's ability to confine radiation. The pattern of responses is similar to the previous question on public health (see Table 16). That is, Amargosa Valley and Beatty residents indicated a relatively low level of concern ( $\bar{X} = 4.65$  and  $\bar{X} = 3.94$ , respectively), while Caliente and Mesquite respondents indicated a relatively high level of concern ( $\bar{X} = 7.58$  and  $\bar{X} = 7.33$ , respectively). Indian Springs responses are near the scale mid-point ( $\bar{X} = 5.10$ ) and Pahrump responses are somewhat above the mid-point ( $\bar{X} = 6.72$ ).

The explanation for these findings is similar to the previous question on health/safety effects. Past and current experiences with hazardous/nuclear facilities likely affect current perceptions of future analogous projects. An interesting finding is the strong level of concern expressed by residents of Caliente and Mesquite.



It is expected that those residents who lived in these communities during atmospheric nuclear weapons testing would be concerned about other nuclear projects. However, it appears that even those residents who did not live in the area during above-ground nuclear weapons testing exhibit concern. It may be that relative newcomers to the area have witnessed the legacies of NTS activities (e.g., cancer). The newer residents may share the reality of that era even though they did not directly experience it. Sharing a past reality is perhaps reinforced by the long battle residents have had with the federal government in order to receive compensation for damages they experienced as a result of atmospheric nuclear weapons testing. This battle has kept the health/safety issues at the forefront for both long- and short-term residents.

*Effects on the economy.* The final question measuring anticipated change is anticipated repository-induced effects on the economy (see Table 16). Respondents from most of the communities anticipated economic benefits, with a mean of 6.84 for the combined communities. However, Amargosa Valley and Beatty respondents overwhelmingly anticipate economic benefits due to the proposed repository ( $\bar{X} = 8.06$  and  $\bar{X} = 7.84$ , respectively). Again, the results are not unexpected. This is particularly the case for Amargosa Valley residents who recently experienced the loss of a major employer in the area (ABC), which resulted in a

nearly 40% population loss (see Trend et al. 1988a). They are therefore eager to see new employment and economic ventures move into the area. Indian Springs and Pahrump respondents also reveal a tendency toward anticipating positive economic effects. Because of the proximity to Yucca Mountain, Amargosa Valley, Beatty, Indian Springs, and to some extent Pahrump can reasonably expect population and employment growth due to repository construction and operation.

Caliente and Mesquite responses are near the scale mid-point ( $\bar{X} = 5.90$  and  $\bar{X} = 4.84$ ). That is, they seem to expect neither positive nor negative effects. Although it is unlikely that Caliente and Mesquite could directly benefit economically from the repository, their location along major transportation corridors suggests modest economic impacts could affect the area.

*Summary.* This section summarizes the results regarding anticipated changes from the proposed Yucca Mountain repository. Residents of Amargosa Valley and Beatty anticipated beneficial effects for their communities and themselves. They anticipated benefits to the economy, and were relatively unconcerned about health/safety effects and risks. Indian Springs and Pahrump residents indicated a balance between beneficial and harmful effects for the community and themselves, anticipating somewhat beneficial economic effects, and modest levels of concern for both

public health/safety and radiation confinement. Caliente respondents anticipated more harm than benefits for both the community and themselves, anticipating slight economic benefits from the repository. Both communities indicated high levels of concern for both public health/safety and radiation confinement. Mesquite residents are similar to Caliente residents on all issues, except Mesquite residents anticipated more economic harm than benefits. One-way ANOVAs and LSD tests statistically support the substantive differences across communities for the five anticipated change variables (see Table 17).

Based upon the results from the five questions addressing anticipated change from the proposed repository,  $H_3$  is supported. That is, residents in these study communities, to varying degrees, anticipate changes associated with the proposed repository. Some of the anticipated changes are perceived as positive, while others are perceived as negative.

#### ***Multiple variable analyses (Hypotheses $H_4$ to $H_7$ )***

The theory sketch developed in Chapter III suggests that once a proposal for a project is introduced, local residents assess their quality of life priorities in light of this new information. The propositions which follow from this theory sketch suggest six hypotheses relating quality of life issues, anticipated repository-induced

Table 17. Least significant difference matrix for anticipated changes due to the repository

	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley						
2. Beatty						
3. Indian Springs	abc e	cd				
4. Pahrump	abcde	abcde	cd			
5. Caliente	abcde	abcde	abcde	abc e		
6. Mesquite	abcde	abcde	abcde	abcde	ae	

a = pairs that are statistically different at  $p < .05$  for anticipated effects on the community.

b = pairs that are statistically different at  $p < .05$  for anticipated effects on the respondent.

c = pairs that are statistically different at  $p < .05$  for anticipated effects on public health.

d = pairs that are statistically different at  $p < .05$  for anticipated effects on radiation confinement.

e = pairs that are statistically different at  $p < .05$  for anticipated effects on the economy.

changes, and the decision to support/oppose the repository ( $H_{4a}$  to  $H_7$ ). The key variable under consideration is the decision to support/oppose the repository. Therefore, prior to a test of the individual hypotheses, an examination of the responses to the decision to support/oppose the repository is warranted.

*Support/oppose the repository*

Responses for the support/oppose variable indicate only a moderate level of support across communities (see Table 18). Nearly half (49.8%) of the combined respondents would either definitely or probably build the repository at Yucca Mountain if the choice was theirs. Approximately one-third (31.1%) would probably or definitely not build the repository at Yucca Mountain, whereas 19.2% were uncertain whether they would or not. Although this finding suggests general support for the repository, the results are not overwhelmingly in favor of its construction at Yucca Mountain.

An inspection of Table 18 shows definite differences across the communities. These differences are most striking between the two communities closest to the proposed site (Amargosa Valley and Beatty) and the two communities farthest from the proposed site (Caliente and Mesquite). For Amargosa Valley and Beatty nearly two-thirds of the respondents indicated support for the

Table 18. Would respondent build the repository if respondent were able to make the final decision (percentages)?<sup>a</sup>

Response	Amargosa Valley	Beatty	Indian Springs	Pahrump	Caliente	Mesquite	Combined
Definitely Yes	47.1	45.3	25.9	20.0	12.8	7.8	25.4
Probably Yes	28.4	28.3	28.4	23.9	20.8	16.7	24.4
Uncertain	10.8	13.2	18.1	21.1	24.8	24.5	19.2
Probably No	4.9	6.6	9.5	7.2	11.2	16.7	9.2
Definitely No	8.8	6.6	18.1	27.8	30.4	34.3	21.9
-----							
Combined Yes	75.5	73.6	54.3	43.9	33.6	24.5	49.8
Combined No	13.7	13.2	27.6	34.0	41.6	51.0	31.1

<sup>a</sup>Items may not total due to rounding error.

repository (75.5% and 73.6%, respectively). In contrast, Caliente and Mesquite respondents overwhelming opposed or were uncertain about the repository with only 33.6% of Caliente and 24.3% of Mesquite favoring the facility. Indian Springs and Pahrump residents were slightly supportive of the repository (54.3% and 43.9%, respectively).

One-way ANOVAs and subsequent LSD procedures reflect the differences across communities (see Table 19). As shown in Table 19, Amargosa Valley and Beatty are statistically different from the other four communities. Mesquite respondents are statistically different from most other communities (except Caliente). Caliente is statistically different from the three communities closest to the proposed Yucca Mountain site (Amargosa Valley,

Table 19. Least significant difference matrix for support/oppose the repository

	(1)	(2)	(3)	(4)	(5)	(6)
1. Amargosa Valley						
2. Beatty						
3. Indian Springs	a	a				
4. Pahrump	a	a	a			
5. Caliente	a	a	a			
6. Mesquite	a	a	a	a		

a = pairs that are statistically different at  $p < .05$  for support/oppose the repository.



Beatty and Indian Springs). The response patterns for the study communities are likely associated with their responses to anticipatory change items discussed in the last section.

#### *Multiple variable analyses*

This section provides a multiple variable analysis to examine whether the results of the previous sections are associated with the decision to support/oppose the proposed repository. That is, this section tests the remaining six hypotheses. The first two hypotheses to be tested are:

H<sub>4a</sub>: If satisfaction with quality of life is high **and** anticipated changes due to the proposed repository are negative, then respondents will oppose the repository.

H<sub>4b</sub>: If community satisfaction is high **and** anticipated changes due to the proposed repository are negative, then respondents will oppose the repository.

The hypotheses are conditional statements with compound antecedents leading to a single consequent. In order to directly test these hypotheses, it is necessary to analyze the data so that the conditions specified match the empirical evidence. For instance, the first antecedent of H<sub>4a</sub> states that "if satisfaction with quality of life is high . . . ." If this first part of the compound antecedent is true, then the second part of the compound antecedent for H<sub>4a</sub> is tested (e.g., "and anticipated changes due to the proposed repository are negative"). If both

parts of the compound antecedent are true, then an examination of the consequent is conducted to determine if the hypothesis is supported. A similar procedure is performed for  $H_{4b}$ .

In order for the antecedent to be true, operational definitions of the compound elements are necessary. Operationally, for a response to be considered as reflecting satisfaction with measures of quality of life and overall community satisfaction, a score has to exceed 6 on the 10-point scale (10 = completely satisfied). Scores of 4 through 6 are regarded as neutral, and scores below 4 are treated as measures of dissatisfaction.

The second half of the compound antecedents is operationalized such that a score has to exceed 6 on the 10-point scale. In order for a response to be considered negative for anticipated repository effects on the community, respondent, and/or economy, a score has to be below 4 on a 10-point scale (0 = "entirely harmful").

The consequent of both  $H_{4a}$  and  $H_{4b}$  is that if the antecedents are true, then there will be opposition to the proposed repository. For a response to be considered as representing opposition to the repository, scores have to reflect a response of either "definitely no" or "probably no."

Table 20 displays the results pertaining to  $H_{4a}$  and  $H_{4b}$

for the combined sample.<sup>80</sup> The first column represents selected indices and questions used to operationalize quality of life (Indices 1, 3, and 4; and questions on overall community satisfaction). The second column consists of the five variables used to measure anticipated change due to the proposed repository. The third column identifies the proportion of respondents that meets the two initial conditions and is subsequently opposed to the repository.

This results in 15 separate tests of the hypothesis related to overall quality of life ( $H_{4a}$ ). In order for each of the tests to support  $H_{4a}$ , the results in column three would have to indicate that a majority of respondents meeting the conditions specified in the hypothesis oppose the repository.

A perusal of the results in Table 20 suggests that this is indeed the case. For each of the 15 possible conditions pertaining to overall quality of life, the respondents indicated opposition to the repository. For

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<sup>80</sup>Results for this section are reported for the combined sample only. It would have been highly desirable to test each hypothesis for the individual communities; however, when taken by individual community, the number of cases satisfying the hypothesized conditions was often reduced to fewer than five cases (occasionally even zero). Therefore, any conclusions drawn would be trivial. Analysis in the following section allows for an examination of community differences.

Table 20. Perceived quality of life is high, anticipated change due to the repository is negative, and oppose the repository

Satisfied with Quality of Life Indicators <sup>a</sup>	Anticipated Change <sup>b</sup> is Negative	% Probably or Definitely Oppose (N)
1. Quality of life Index 1 (services)	community (harmful)	92.9 (79) <sup>c</sup>
	respondent (harmful)	91.3 (63) <sup>c</sup>
	health/safety (concerned)	83.1 (98) <sup>c</sup>
	radiation (concerned)	73.6 (103) <sup>c</sup>
	economy (harmful)	94.3 (33) <sup>c</sup>
2. Quality of life Index 3 (youth/rec.)	community (harmful)	96.9 (31) <sup>c</sup>
	respondent (harmful)	86.2 (25) <sup>c</sup>
	health/safety (concerned)	80.4 (41) <sup>c</sup>
	radiation (concerned)	76.3 (45) <sup>c</sup>
	economy (harmful)	100.0 (20) <sup>c</sup>
3. Quality of life Index 4 (friendliness)	community (harmful)	93.8 (136) <sup>c,r</sup>
	respondent (harmful)	91.5 (107) <sup>c</sup>
	health/safety (concerned)	81.6 (168) <sup>c</sup>
	radiation (concerned)	72.0 (183) <sup>c</sup>
	economy (harmful)	94.4 (68) <sup>c</sup>
4. Overall community satisfaction	community (harmful)	94.1 (127) <sup>d</sup>
	respondent (harmful)	92.4 (97) <sup>d</sup>
	health/safety (concerned)	82.2 (157) <sup>d</sup>
	radiation (concerned)	72.4 (168) <sup>d</sup>
	economy (harmful)	94.4 (68) <sup>d</sup>

<sup>a</sup>Responses are considered high if satisfaction scores are > 6 (e.g., toward the "completely satisfied" end of the scale).

<sup>b</sup>Responses are considered negative if scores are > 6 for concern over health/safety and radiation confinement (e.g., toward the "extremely concerned" end of the scale). Responses are considered negative for scores < 4 for harm to the community, respondent, and economy (e.g., toward the "entirely harmful" end of the scale).

<sup>c</sup>Tests Hypothesis 4<sub>1</sub>.

<sup>d</sup>Tests Hypothesis 4<sub>2</sub>.

the three anticipated change variables pertaining to harmful effects (on the community, respondent, and economy), respondents overwhelmingly oppose the repository, with values well over 85%. The anticipated health/safety question consistently yielded strong levels of opposition, with the percentages approximating 80%. The condition pertaining to radiation confinement was somewhat lower, but nonetheless over 70% of the respondents were in opposition. Overall, these results clearly support  $H_{4a}$ .

Item 4 in Table 20 represents the findings for  $H_{4b}$  (overall community satisfaction).<sup>81</sup> In practical terms five tests of this hypothesis are performed (item 4 with each of the five anticipated change conditions). The results indicate that respondents who demonstrated overall community satisfaction, and rated effects from the proposed repository as harmful, consistently opposed the repository (either probably or definitely), with opposition ranging from a high of 94.4% for anticipated harmful effect on the economy to 72.4% for concern over anticipated radiation confinement. Thus, the results strongly support  $H_{4b}$ .

The next three hypotheses center on economic issues. As with the previous hypotheses, two of the following three hypotheses involve conditional statements with compound

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<sup>81</sup>Although overall community satisfaction is also a common indicator of overall quality of life, the importance of this item warrants a separate analysis.

antecedents and a single consequent. The univariate analyses and ethnographic data offered in the previous section demonstrated that economic issues are particularly important to residents in the study communities. However, rather than focusing on *opposition*, the following hypotheses suggest that respondents who indicate economic dissatisfaction, along with anticipating economic benefits from the repository, will *support* the repository.

Specifically, the hypotheses are:

- H<sub>5</sub>: If economic and employment satisfaction are perceived as low, then respondents in the study communities will anticipate positive economic changes from the proposed repository.
- H<sub>6a</sub>: If economic satisfaction is low **and** there are positive economic changes anticipated due to the proposed repository, then respondents will support the repository.
- H<sub>6b</sub>: If employment opportunities are viewed as low **and** there is anticipated positive economic change due to the proposed repository, then respondents will support the repository.

The operationalization of these hypotheses is similar to the procedures used for H<sub>4a</sub> and H<sub>4b</sub>. That is, first an examination of the conditional antecedent phrase is undertaken (e.g., if economic and employment satisfaction is low). Operationally, economic and employment satisfaction is considered low if responses are lower than 4. Anticipated economic change as a result of the repository is considered beneficial if responses exceed 6. After determining if the antecedent condition is true, an



examination of the consequent takes place (e.g., "support the repository"). Respondents are considered supportive of the repository when their response to the question is either "probably support" or "definitely support" the repository. The results for  $H_5$ ,  $H_{6a}$ , and  $H_{6b}$  are presented in Table 21.

$H_5$  simply stated that if economic and employment satisfaction is low, then respondents would anticipate economic benefits from the repository. Two questions were used to operationalize economic and employment satisfaction: (1) personal economic satisfaction, and (2) Index 2 (job/income) opportunities. The results in column two of Table 21 clearly demonstrate that over three-fourths of the respondents were dissatisfied with their personal economic situation. Similarly, respondents who were dissatisfied with their community economic situation (Index 2) also anticipate economic benefits from the proposed repository (80%). Both of these results strongly support  $H_5$ .

$H_{6a}$  and  $H_{6b}$  follow from  $H_5$ , and the results testing them are also presented in Table 21. As can be seen in column three of Table 21, respondents who are dissatisfied with their personal economic situation and anticipate economic benefits from the repository (column 2) overwhelmingly support the repository (column 3), with over 85% indicating



Table 21. Perceived economic situation is low, anticipated economic change due to the repository is high, and support the repository

Current Levels of Economic Satisfaction are Low <sup>a</sup>	Anticipated Economic Change is Beneficial <sup>b</sup>	% Probably or Definitely Support (N)
1. Personal economic satisfaction	75.3 (64)	86.5 (45)
2. Index 2 (job/income)	80.3 (257)	85.4 (175)

<sup>a</sup>Responses are considered low if satisfaction scores are < 4 (e.g., toward the "completely dissatisfied" end of the scale).

<sup>b</sup>Responses are considered beneficial if scores are > 6 (e.g., toward the "entirely beneficial" end of the scale).

support. Similarly, respondents who are dissatisfied with available job/income opportunities within the community and anticipate economic benefits from the repository support the repository. Therefore, both  $H_{6a}$  and  $H_{6b}$  are also supported.

The final hypothesis to be tested addresses the issue of community attachment. Specifically, this hypothesis states that:

$H_7$ : If respondents demonstrate community attachment and anticipate negative changes due to the proposed repository, then respondents will oppose the repository.

Recall from the univariate analyses that community attachment is operationalized using three variables (see Table 10). To convert the data to meet the hypothesized conditions for  $H_7$ , respondents are considered strongly attached to their community if: (1) the proportion of

friends residing in the community is over 60%; (2) scores for the local sentiment (Index 5) are greater than 6 on a 10-point scale; and (3) respondents indicated either "probably" or "definitely" will not move.

The response pattern observed for the previous five hypotheses is similar to the responses to the community attachment variables (see Table 22). For the three anticipated change variables pertaining to harmful effects (on the community, respondent, and economy), respondents overwhelmingly oppose the repository, with percentages in opposition over 90%. The scores were somewhat lower for concern over health and safety effects, with scores slightly above 80%. Finally, percentages for radiation confinement ranged from 72.8% to 76.0%. The results clearly support  $H_7$ .

#### *A test of the theoretical model*

The theory sketch described in Chapter III produced a conceptual model of how residents arrive at the decision to support/oppose a proposed project. Briefly, the model suggests that residents have perceptions about themselves and their community which occur within their social and physical environments (e.g., community context). Based on current perceptions, residents formulate future aspirations for themselves and their community. Once some action is proposed for an area, local residents are forced to

Table 22. Community attachment is high, anticipated change is negative, and oppose the repository

Community Attachment Indicators <sup>a</sup>	Anticipated Change <sup>b</sup> is Negative	% Probably or Definitely Oppose (N)
1. proportion of friends	community (harmful)	96.0 (97)
	respondent (harmful)	92.6 (75)
	health/safety (concerned)	82.1 (115)
	radiation (concerned)	76.0 (127)
	economy (harmful)	97.9 (47)
2. local sentiments (Index 5)	community (harmful)	95.3 (123)
	respondent (harmful)	93.8 (105)
	health/safety (concerned)	82.3 (158)
	radiation (concerned)	72.8 (171)
	economy (harmful)	94.1 (64)
3. plans to move	community (harmful)	95.4 (125)
	respondent (harmful)	93.6 (103)
	health/safety (concerned)	82.4 (155) <sup>c</sup>
	radiation (concerned)	74.7 (165)
	economy (harmful)	95.6 (65)

<sup>a</sup>Responses are considered high if proportion of friends residing the community is greater than 60 percent. Responses are considered high if local sentiment scores are > 6. Responses are considered high for plans to move if respondent indicated either definitely or probably will not move.

<sup>b</sup>Responses are considered negative if scores are > 6 for concern over health/safety and radiation confinement. Responses are considered negative for scores < 4 for harm to the community, respondent, and economy.

evaluate the perceptions they hold for themselves and their community in light of information they possess about the proposed action and its developers. The results of this evaluation produce the anticipation of changes due to the proposed project. If residents perceive the salient changes as positive, they will support the proposed action. However, if after balancing the issues the salient changes are perceived as negative, then the proposed action will be opposed.

To determine if the theoretical model holds true for the empirical world, the data warrant further analysis. As in the previous analysis, the data are separated into four groups: (1) current levels of satisfaction/attachment; (2) future quality of life aspirations; (3) anticipated repository effects; and (4) support/oppose the repository.

First, however, an examination of the bivariate correlations is necessary. The correlation matrix is presented in Table 23. The correlations for the variables or indices (items 2 through 13) with the decision to support/oppose the repository (item 1) indicate relatively low correlations. Although a few of the correlations are statistically significant, substantively there is little association, with the highest correlation a modest  $r = .15$  between item 13 (quality of life Index) and support/oppose the repository.

Table 23. Correlation matrix of all variables for the combined communities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. support/oppose	1.00									
Current Levels of Satisfaction/Attachment										
2. overall community satisfaction	-.06	1.00								
3. overall economic satisfaction	-.08 <sup>a</sup>	.27 <sup>b</sup>	1.00							
4. Index 1 (services)	.02	.32 <sup>b</sup>	.25 <sup>b</sup>	1.00						
5. Index 2 (job/income)	-.07	.29 <sup>b</sup>	.31 <sup>b</sup>	.34 <sup>b</sup>	1.00					
6. Index 3 (youth/rec)	.11 <sup>a</sup>	.32 <sup>b</sup>	.27 <sup>b</sup>	.43 <sup>b</sup>	.37 <sup>b</sup>	1.00				
7. Index 4 (friendliness)	-.01	.72 <sup>b</sup>	.19 <sup>b</sup>	.33 <sup>b</sup>	.27 <sup>b</sup>	.35 <sup>b</sup>	1.00			
8. friends	-.01	.11 <sup>b</sup>	.03	-.07	.02	-.03	.11 <sup>a</sup>	1.00		
9. Index 5 (sentiments)	-.07 <sup>a</sup>	.77 <sup>b</sup>	.27 <sup>b</sup>	.34 <sup>b</sup>	.32 <sup>b</sup>	.28 <sup>b</sup>	.76 <sup>b</sup>	.11 <sup>b</sup>	1.00	
10. plans to move	.04	-.53 <sup>b</sup>	-.20 <sup>b</sup>	-.24 <sup>b</sup>	-.18 <sup>b</sup>	-.20 <sup>b</sup>	-.44 <sup>b</sup>	-.11 <sup>b</sup>	-.49 <sup>b</sup>	1.00
Future Quality of Life Aspirations:										
11. preserve existing way of life	.13 <sup>b</sup>	.36 <sup>b</sup>	.23 <sup>b</sup>	.23 <sup>b</sup>	.17 <sup>b</sup>	.29 <sup>b</sup>	.42 <sup>b</sup>	.08 <sup>a</sup>	.35 <sup>b</sup>	-.27 <sup>b</sup>
12. limit population growth	.09 <sup>a</sup>	.18 <sup>b</sup>	.16 <sup>b</sup>	.10 <sup>a</sup>	.13 <sup>b</sup>	.16 <sup>b</sup>	.13 <sup>b</sup>	.09 <sup>a</sup>	.15 <sup>b</sup>	-.15 <sup>b</sup>
13. Index 6 (qofl)	.15 <sup>b</sup>	.15 <sup>b</sup>	.02	.21 <sup>b</sup>	-.01	.08 <sup>a</sup>	.22 <sup>b</sup>	.08 <sup>a</sup>	.19 <sup>b</sup>	-.11 <sup>b</sup>
Repository Effects On:										
14. community	-.76 <sup>b</sup>	.10 <sup>b</sup>	.09 <sup>b</sup>	-.02	.03	-.05	.02	.03	.11 <sup>b</sup>	-.03
15. respondent	-.70 <sup>b</sup>	.10 <sup>a</sup>	.06	-.01	.03	-.02	-.01	-.01	.05	-.04
16. public health	.72 <sup>b</sup>	-.10 <sup>a</sup>	-.10 <sup>a</sup>	-.00	-.07	.09 <sup>a</sup>	.00	-.03	-.10 <sup>a</sup>	.04
17. radiation confinement	.67 <sup>b</sup>	-.04	-.11 <sup>b</sup>	-.01	-.10 <sup>b</sup>	.09 <sup>a</sup>	.06	-.01	-.06	.06
18. economy	-.60 <sup>b</sup>	.04	.04	-.02	.00	-.10 <sup>a</sup>	.01	-.04	.06	-.00

<sup>a</sup>p<.05

<sup>b</sup>p<.01

Table 23 continued.

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. support/oppose								
Current Levels of Satisfaction/Attachment								
2. overall community satisfaction								
3. overall economic satisfaction								
4. Index 1 (services)								
5. Index 2 (job/income)								
6. Index 3 (youth/rec)								
7. Index 4 (friendliness)								
8. friends								
9. Index 5 (sentiments)								
10. plans to move								
Future Quality of Life Aspirations:								
11. preserve existing way of life	1.00							
12. limit population growth	.32 <sup>b</sup>	1.00						
13. Index 6 (qofl)	.34 <sup>b</sup>	.12 <sup>b</sup>	1.00					
Repository Effects On:								
14. community	-.06	-.12 <sup>b</sup>	-.09 <sup>a</sup>	1.00				
15. respondent	-.10 <sup>a</sup>	-.16 <sup>b</sup>	-.10 <sup>a</sup>	.84 <sup>b</sup>	1.00			
16. public health	.10 <sup>a</sup>	.09 <sup>a</sup>	.13 <sup>b</sup>	-.70 <sup>b</sup>	-.68 <sup>b</sup>	1.00		
17. radiation confinement	.14 <sup>b</sup>	.14 <sup>b</sup>	.20 <sup>b</sup>	-.66 <sup>b</sup>	-.66 <sup>b</sup>	.80 <sup>b</sup>	1.00	
18. economy	-.09 <sup>a</sup>	-.12 <sup>a</sup>	-.01	.69 <sup>b</sup>	.63 <sup>b</sup>	-.52 <sup>b</sup>	-.47 <sup>b</sup>	1.00

<sup>a</sup>p < .05

<sup>b</sup>p < .01

The next phase of the conceptual model is the introduction of the exogenous variable of a proposed action. The theory sketch suggests that future aspirations held by residents will be evaluated in light of information about the proposed action. From this evaluation residents determine the saliency of their aspirations and the likely anticipated effects on those aspirations by the proposed action. If the salient anticipated consequences are perceived as positive, the respondents will support the proposed action. Empirically, the previous section, which tested hypotheses  $H_{4a}$  through  $H_7$ , supports this last assertion of the model.

The conceptual model suggests that anticipated changes will be important factors determining whether respondents support/oppose the repository. A return to Table 23 illustrates that this is not the case. The correlations between the anticipated effects (items 14 through 18) with the decision to support/oppose the repository (item 1) are all both substantively and statistically significant, with correlations ranging from  $r = .60$  (for anticipated effects on the economy) to  $r = -.76$  (for anticipated effects on the community).

Although these generally support the conceptual model, they provide no information as to how the various groups of



variables,<sup>82</sup> when taken together, explain residents' decision to support/oppose the repository. To more accurately assess the importance of the groups of variables on respondents' decision to support/oppose the repository, a series of multiple regression analyses were performed. The regression analyses involved three models, with the decision to support/oppose the repository as the dependent variable in each model. The regression analyses assess the relative importance of each of the groups in explaining the respondents' decision to support/oppose the proposed repository.

The three groups of variables were entered into each of the regression models based on their order given in the theory sketch. Recall that the theory sketch suggests that residents have existing perceptions about themselves and their community. These perceptions were operationalized as current levels of satisfaction and attachment, and were entered alone in Model I. Therefore, the first model consists of the current quality of life variables (e.g., satisfaction and attachment variables) and the dependent variable of support/oppose the repository.

In addition to current perceptions, residents have aspirations or goals for themselves and their community.

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<sup>82</sup>The groups of variables are different ways of measuring the same underlying concept. The groups consist of both individual questions and indices.

These goals were operationalized as future quality of life aspirations, and were combined with the previous variables to comprise Model II. When a project is introduced into the area, residents reassess their quality of life aspirations in light of information known about the project and anticipated changes due to the proposed project. The anticipated change variables were added to the previous two groups of variables to create Model III. Thus, the final model includes all of the variables in this study.<sup>83</sup>

Table 24 provides the results of the three regression models. The beta coefficients (or partial regression coefficients) represent the standardized value for each of the independent variables on the dependent variable when all other independent variables are held constant. Thus, the relative importance of each independent variable is indicated by the beta coefficient. For instance, in Model I, item 5 (youth/recreation Index) has a higher beta value (.1147) than item 1 (overall community satisfaction) (-.0393) and, therefore, explains slightly more variance in the dependent variable (support/oppose the repository).

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<sup>83</sup>The correlation matrix indicated that several of the anticipated changes variables were highly correlated with each other. If these items were entered into the regression equations/analyses individually, the problem of multicollinearity would render the partials uninterpretable. However, because these variables are entered into the regression equations as a group to assess their combined effect, the multicollinearity problem is avoided.

Table 24. Regression models for the combined communities using current levels of community satisfaction and attachment, future quality of life aspirations, and anticipated changes due to the repository on the decision to support/oppose the repository

Independent Variables	MODEL I ( $\beta$ )	MODEL II ( $\beta$ )	MODEL III ( $\beta$ )
Current Levels of Satisfaction/Attachment			
1. overall community satisfaction	-.039	-.053	-.030
2. overall economic satisfaction	-.003	-.032	-.006
3. Index 1 (services)	.036	.032	.009
4. Index 2 (job/income)	-.061	-.046	.012
5. Index 3 (youth/rec)	.115 <sup>a</sup>	.081	.014
6. Index 4 (friendliness)	.131	.114	.001
7. proportion of friends	-.016	-.024	.010
8. Index 5 (local sentiments)	-.116	-.119	.010
9. plans to move	.048	.060	.041
Future Quality of Life Aspirations:			
10. preserve existing way of life		.076	.054
11. limit population growth		.075	-.050
12. Index 6 (future quality of life)		.052	-.011
Repository Effects On:			
13. community			-.234 <sup>b</sup>
14. respondent			-.173 <sup>b</sup>
15. public health			.275 <sup>b</sup>
16. radiation confinement			.141 <sup>a</sup>
17. economy			-.140 <sup>b</sup>
Multiple R	.167	.208	.834
R <sup>2</sup>	.028	.043	.695
Adjusted R <sup>2</sup>	.008	.017	.677

<sup>a</sup>p < .05

<sup>b</sup>p < .01

However, in Model II, when additional variables are added, the relative importance of each variable changes, because the values must now take into account the relative importance of each additional variable added to the model.

For all three regression models, the relative importance (betas) of both the current levels of satisfaction/attachment (items 1 through 9) and future quality of life aspirations (items 10 through 12) remain statistically insignificant. However, the anticipated repository effects (items 13 through 17), when added to Model III, result in statistically and substantively significant betas, indicating that these variables contribute significantly to respondents' decision to support/oppose the repository.

Current perceptions and future quality of life aspirations are commonly found to be important issues to residents, and one would therefore expect this impact on residents' decision making to be stronger. However, these results suggest that, although quality of life issues contribute to our ability to predict responses, the overriding salient issues are anticipated effects.

The multiple correlation coefficient  $R^2$  represents the proportion of variance in the support/oppose variable accounted for by the independent variables within each model. In Model I, the independent variables (current levels of satisfaction and attachment) account only for

2.8% of the variation in the decision to support/oppose the repository.  $R^2$  is only slightly increased (4.3) when the second set of variables (future aspirations) is added in Model II. Not until the third set of variables (anticipated effects) is added in Model III does  $R^2$  reach a substantial value, where the independent variables jointly explain 69.5% of the variation in the dependent variable (support/oppose the repository).

Model III, which includes all sets of variables, allows the assessment of the relative magnitude each group of variables exerts on the dependent variable of support/oppose. As suggested by the conceptual model, once the proposed action is introduced to the area, residents are forced to consider this information. Based on their evaluation of salient issues and the anticipated effects of those issues, residents will either support or oppose the proposed action. The regression models clearly reflect the impact of anticipated effects on the decision to support/oppose the proposed repository, thereby upholding the conceptual model.

The literature suggests that quality of life variables are important, yet the results indicate they pale when compared to anticipated changes. A possible explanation for this finding may be due to the sequence of how the questions were asked, and how the anticipated effects are altered by the previous questions. That is, respondents

considered quality of life issues *before* addressing the anticipated change questions. By the time respondents reached the anticipated change questions the previous questions had created an additive effect. Therefore, even though anticipated changes are the strongest predictors of support/opposition to the repository, current perceptions and future aspirations are important antecedent factors.

The conceptual model derived from the theory sketch also suggests that there are important baseline conditions which shape people's perceptions, namely their social and physical environments. Operationally, this refers to the community context. As a final step to assessing the overall effectiveness of the conceptual model, community context was added to the multiple regression models to determine if community of residence has an affect on the decision to support/oppose the proposed action (e.g., the proposed repository).

In order to effectively use community of residence as a variable in the regression analyses, dummy variables were created. The control community (or constant in the regression models) is Mesquite.<sup>84</sup> That is, each community is compared with Mesquite to assess differences between

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<sup>84</sup>Mesquite was selected as the control community for two reasons: (1) it is one of the more economically stable communities; and (2) it is located farthest from the proposed repository and thus less likely to be severely affected (socially or economically) by repository construction and/or operation.



communities.

The revised regression models which now include community of residence are presented in Table 25. The revised models contain two columns of information, unstandardized coefficient (b's) and standardized coefficients ( $\beta$ ). The b's are included in these models to interpret the affect of community of residence. For instance, in Model I, the value of the constant (Mesquite) is 2.940. By taking the value of the constant and adding the b's for each community, the relative differences can be assessed. For instance, the decision by Caliente residents to support/oppose the repository is only slightly lower than the constant (2.940 plus  $-.287$ ), indicating these two communities are similar in their responses. However, the b's for the communities of Amargosa Valley ( $-1.611$ ) and Beatty ( $-1.709$ ) are significantly less than the constant (2.94), indicating that these two communities are indeed different than Mesquite and Caliente. The communities of Pahrump and, to some extent, Indian Springs are in the middle, yet still different from Mesquite. As more variables are added into the subsequent regression models (II and III), the differences across communities are modified, yet the same general pattern holds true. Amargosa Valley and Beatty residents are significantly different from Mesquite and Caliente, and Indian Springs and Pahrump are slightly different from Mesquite.



Table 25. Regression models including study communities for current levels of community satisfaction and attachment, future quality of life aspirations, and anticipated changes due to the repository on the decision to support/oppose the repository

Independent Variables	MODEL I		MODEL II		MODEL III	
	(b)	( $\beta$ )	(b)	( $\beta$ )	(b)	( $\beta$ )
Community						
D1 (Amargosa Valley)	-1.611	-.371 <sup>b</sup>	-1.579	-.373 <sup>b</sup>	-.492	-.116 <sup>b</sup>
D2 (Beatty)	-1.709	-.442 <sup>b</sup>	-1.671	-.438 <sup>b</sup>	-.592	-.154 <sup>b</sup>
D3 (Indian Springs)	-.990	-.248 <sup>b</sup>	-.977	-.249 <sup>b</sup>	-.121	-.029
D4 (Pahrump)	-.571	-.157 <sup>b</sup>	-.626	-.173 <sup>b</sup>	-.082	-.023
D5 (Caliente)	-.287	-.078	-.198	-.054	.040	.010
Current Levels of Satisfaction/Attachment						
1. overall community satisfaction	.014	.022	.012	.020	-.017	-.026 <sup>c</sup>
2. overall economic satisfaction	-.004	-.008	-.022	-.039	-.005	-.008
3. Index 1 (services)	.007	.010	.004	.005	-.001	-.001
4. Index 2 (job/income)	.049	.088	.054	.097	.030	.054
5. Index 3 (youth/rec)	.008	.015	-.006	-.010	.001	.001
6. Index 4 (friendliness)	.021	.027	.016	.021	-.017	-.021
7. proportion of friends	-.010	-.006	-.021	-.013	.017	.010
8. Index 5 (sentiments)	-.031	-.045	-.032	-.048	.026	.037
9. plans to move	.168	.112 <sup>a</sup>	.176	.120 <sup>a</sup>	.075	.049
Future Quality of Life Aspirations:						
10. preserve existing way of life			.020	.034	.021	.038
11. limit population growth			.041	.098 <sup>a</sup>	-.013	-.032
12. Index 6 (future quality of life)			.011	.010	-.024	-.022
Repository Effects On:						
13. community					-.120	-.241 <sup>b</sup>
14. respondent					-.078	-.152 <sup>a</sup>
15. public health					.107	.258 <sup>b</sup>
16. radiation confinement					.050	.123 <sup>a</sup>
17. economy					-.067	-.129 <sup>b</sup>
Constant	2.940		2.694		3.545	
Multiple R	.423		.442		.846	
R <sup>2</sup>	.179		.195		.715	
Adjusted R <sup>2</sup>	.153		.163		.693	

<sup>a</sup>p<.05

<sup>b</sup>p<.01

A comparison of the multiple correlation coefficient ( $R^2$ ) between the original regression models (Table 24) and the revised regression models (Table 25) indicates that knowing the community of residence for respondents increases the ability to predict support/opposition to the proposed repository. That is, the  $R^2$  increased from .028 to .179 for Model I. The explained variance increased from 4.3% to 19.5% for Model II, and from 69.5% to 71.5% in Model III. The large increase in  $R^2$  for regression models I and II (and the small increase in model III) indicates respondents in these communities are taking context into account when answering. This implies community context is included in repository effects questions, thereby supporting the assertion made by the conceptual model that the decision to support or oppose a proposed action is additive.

The bottom line of this analysis is that the empirical evidence presented in this study supports the theoretical model. That is, social and physical environments (i.e., community context), as the theoretical model suggests, play an important role in determining respondents' evaluations of a proposed action.

## CHAPTER VII

## DISCUSSION AND CONCLUSIONS

This chapter brings together the empirical results of the analysis and the broader theoretical expectations. It not only summarizes the current study, but also offers suggestions for further research.

*Overview*

Rural residents of southern Nevada are currently faced with the possibility of hosting the nation's first high-level nuclear waste repository. The physical and social ramifications of such a large-scale, high-risk project will likely alter many residents' ways of life. Whether the effects of the repository are perceived by residents as positive or negative is an important issue. However, planning to explain the consequence of such an issue is difficult insofar as there is little theoretical or empirical information from which to anticipate social responses.

The purpose of this study is to help alleviate this lack of information. The specific issues addressed in this dissertation are (1) to predict how people respond to a proposed project; and (2) to explain why people respond the way they do.

The unfortunate lack of an explicit formal theory to guide the investigation of quality of life issues and

anticipated future states is due, in part, to the fact that no facility like the one proposed for Yucca Mountain has ever been built. Thus, guiding principles were necessarily extrapolated from other research contexts. This led to the formation of a theory sketch which is based on perspectives, paradigms, and worldviews readily available in the literature of rural and environmental sociology. According to this theory sketch, residents have existing current and future perceptions about themselves and their communities. When a proposed facility is introduced into the area, residents are forced to evaluate their perceptions in light of the new information. Based upon their new evaluation, they will either support/oppose the proposed facility.

### *Summary of findings*

From this theory sketch, eleven hypotheses regarding the relationship between quality of life and support/opposition for the proposed Yucca Mountain facility follow. The previous chapter presented the survey and ethnographic information obtained from rural Nevada residents, and empirically examined the hypotheses. The following is a discussion of the key findings pertaining to: (1) quality of life issues; (2) anticipated repository effects; and (3) support or opposition to the repository.

*Quality of life issues*

The conceptual model suggests residents have both current perceptions of their quality of life, and hold future aspirations for themselves and their community. Therefore, for analytic purposes quality of life was analyzed in terms of these two categories.

Current perceptions of one's self and community were operationalized by using levels of community satisfaction and attachment. Results indicate that residents are satisfied, overall, with their communities (see Table 8). However, some aspects of the community (e.g., available economic opportunities) were not perceived as satisfactory (see Table 3). As noted earlier, it is not unusual for rural residents, especially those in communities with a history of economic instability, to question future economic stability. Even though respondents tended to view their community's economic situation as less than satisfactory, they were more or less satisfied with their personal economic situation.

Residents also indicated relatively high levels of integration into their communities (see Table 10). This is evidenced by the finding that: (1) over 60% of the people they considered close friends lived in the area; (2) the majority of residents were not planning to move from their community during the next five years; and (3) most respondents expressed high levels of local sentiment (e.g.,

feelings of belongingness).

Residents indicated the importance of six questions pertaining to their future quality of life. An index was constructed using four of the six questions. Results indicated that both the future quality of life index and preserving existing ways of life are important issues to area residents, whereas limiting population growth was viewed as slightly unimportant<sup>85</sup> (see Table 14). These results are likely a result of the perceived need for economic growth, which is usually accompanied by population growth.

#### *Anticipated changes*

Five questions were used to address various types of anticipated change due to the proposed repository. Such changes included anticipated benefits to the community, the respondent, and the economy. Two additional questions addressed concerns about public health/safety and radiation confinement. In contrast to the little variation across communities on quality of life issues, responses to anticipated changes varied across the study communities. Residents of Amargosa Valley and Beatty anticipated beneficial effects for their communities and themselves. They anticipated benefits to the economy, and were relatively unconcerned about health/safety effects and

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<sup>85</sup>Pahrump residents were the only exception to this.

risks. Indian Springs and Pahrump residents indicated a balance between beneficial and harmful effects for the community and themselves, while anticipating somewhat beneficial economic effects. They also exhibited modest levels of concern for both public health/safety and radiation confinement.

Caliente respondents anticipated more harm than benefits for both the community and themselves, anticipated slight economic benefits from the repository, and indicated high levels of concern for both public health/safety and radiation confinement. Mesquite residents were similar to Caliente residents on all issues, except Mesquite residents anticipated that more economic harm than benefits would result from the repository.

#### *Support/oppose the proposed repository*

Responses for the combined sample indicated moderate support for the proposed repository. However, there were significant differences across the communities in their levels of support. The differences were most pronounced between the two communities closest to the proposed site (Amargosa Valley and Beatty), and the two communities farthest from the proposed site (Caliente and Mesquite). In Amargosa Valley and Beatty nearly two-thirds of respondents supported the repository, whereas in Caliente and Mesquite respondents overwhelmingly opposed the repository. Indian Springs and Pahrump residents were only



slightly supportive of the repository.

### *Hypotheses revisited*

The results described above lend support to four of the first five hypotheses derived from the theory sketch. The exception is  $H_{2a}$  where it was expected that respondents would be dissatisfied with their economic situations. To the contrary, respondents were generally satisfied, with the mean score slightly above the mid-point (see Table 8). It may be the case that some residents are satisfied with their situations. Some may have good, high-paying jobs. Still others may be rationalizing their situation in order to avoid cognitive dissonance (see Festinger 1962). In any event, the hypothesis was not supported. The four supported hypotheses are:

- $H_{1a}$ : Residents in the study communities will display general satisfaction with their quality of life.
- $H_{1b}$ : Residents in the study communities will demonstrate a high overall level of community satisfaction.
- $H_{2a}$ : Residents in the study communities will demonstrate dissatisfaction with their economic situation.
- $H_3$ : Residents in the study communities will anticipate that there will be changes associated with the proposed repository.

Six additional hypotheses were derived from the theory sketch. These hypotheses examine the relationship between quality of life issues, anticipated repository-induced

changes, and the decision to support/oppose the repository.

The specific hypotheses are:

- H<sub>4a</sub>*: If satisfaction with quality of life is high and anticipated changes due to the proposed repository are negative, then respondents will oppose the repository.
- H<sub>4b</sub>*: If community satisfaction is high and anticipated changes due to the proposed repository are negative, then respondents will oppose the repository.
- H<sub>5</sub>*: If economic and employment satisfaction are perceived as low, then respondents in the study communities will anticipate positive economic changes from the proposed repository.
- H<sub>6a</sub>*: If economic satisfaction is low and there are positive economic changes anticipated due to the proposed repository, then respondents will support the repository.
- H<sub>6b</sub>*: If employment opportunities are viewed as low and there is anticipated positive economic change due to the proposed repository, then respondents will support the repository.
- H<sub>7</sub>*: If respondents demonstrate community attachment and anticipate negative changes due to the proposed repository, then respondents will oppose the repository.

These six hypotheses are overwhelmingly supported by the empirical evidence for the combined communities (see Tables 20, 21 and 22).

Finally, an empirical test of the theoretical model was conducted. Using a series of regression models, each component of the theoretical model was cumulatively introduced into the analysis. The results clearly supported the theoretical model. However, it should be noted that while quality of life issues contributed to our

ability to predict repository responses, the responses to questions on the anticipated effects were the strongest predictors of support or opposition to the proposed project (see Tables 24 and 25).

### *Conclusions*

The results from this analysis provide important information about the saliency of quality of life issues and anticipated changes associated with any proposed project. The most important finding is that current perceptions and future aspirations, even though important issues to rural Nevada residents, are overshadowed by anticipated changes from the proposed Yucca Mountain repository. Furthermore, these perceptions are to a large extent shaped by the social and physical environments (e.g., community context). These results provide important insights into the role individual perceptions have in residents' decision to support/oppose a proposed project.

The substantive differences across communities on the decision to support or oppose the repository suggest that the unique sociocultural contexts of individual communities play a significant role in determining local attitudes and perceptions. In particular, differential experiences with health/safety and economic benefits from NTS have lingering effects on residents' perceptions for the future. The evidence suggests that "risk perception shadows" (Stoffle et al. 1988), primarily the result of atmospheric nuclear

weapons testing, are casting shadows of doubt about the health/safety of the proposed Yucca Mountain project, at least for residents residing in communities northeast ("downwind") of NTS (e.g., Caliente and Mesquite).

Differential economic experiences as a result of NTS activities likely contribute to existing perceptions. Those communities more proximate to the proposed repository have historically received economic and employment benefits from NTS and related federal projects and are likely to have experienced additional employment and economic advantages. In contrast, residents of those communities more distant from the proposed site, who have for the most part not directly benefitted from past employment and economic benefits associated with NTS, are not likely to receive direct economic and employment benefits from the repository project. The evidence reveals that residents who anticipate more economic benefits than harm from the repository support the project. In contrast, residents who do not anticipate economic benefits tend to oppose the repository project.

Although differences were found across the individual communities, the evidence provided here indicates that the broader theoretical model guiding this study holds true.<sup>86</sup> The theoretical model states that individuals have current

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<sup>86</sup>Results indicate that 72% of the variance is explained using the theoretical model.

perceptions about themselves and their community. These perceptions take place within the context of their unique social and physical environments (e.g., the community context).<sup>87</sup> Based on current perceptions, residents formulate future aspirations for themselves and their community. Thus, residents' current perceptions and future community aspirations are largely attributable to their unique sociocultural histories and experiences. This suggests that communities are different and must be examined individually.

When a proposed action is introduced into an area, residents evaluate their perceptions in light of this new information. Anticipated changes due to the proposed project influence whether residents perceive their quality of life as being altered by the proposed action. Among the future aspirations and anticipated changes, some issues will be more salient to residents than others. The outcome of balancing these issues determines whether the proposed action is supported or opposed.

### *Limitations and suggestions for future research*

#### *Limitations of the study*

As is the case with most social science research,

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<sup>87</sup>Results from the regression analyses clearly support the effects of community of residence as a contributing factor in residents' decision to support/oppose the proposed facility.

there are limitations to this study. The first limitation is that the survey instrument was designed to cover a broad array of topics potentially important to rural Nevada residents residing in several communities. The ability to include enough information to carefully analyze all potentially important issues related to siting the repository itself is a complex task. Therefore, the limited number of questions available to answer any particular question may not be adequate for a comprehensive analysis of all quality of life issues. It may be the case that in some communities the salient issues were addressed by many questions, whereas in other communities, there were not enough questions to cover all of the salient issues.

A second limitation to this study is the fact that the questions asked of respondents focused on *anticipated* changes. That is, respondents were asked to look into the future and anticipate the likely effects of the project. Although anticipated effects shape individuals' perceptions and behavior, because no project like the one proposed for Yucca Mountain has ever been built, there is no common frame of reference on which respondents can base their perceptions. Furthermore, the actual construction of the repository at Yucca Mountain is, to some extent, uncertain since the final decision to build at Yucca Mountain has not been made. Therefore, some residents may view repository issues as something they will deal with when the time



comes, and not worry about for the present.

A final limitation is that the present data are now somewhat dated. Since the data are generally over five years old, and substantial changes have likely occurred since their collection, conclusions about rural residents' perceptions may not accurately extend to their current views of the project. However, the theoretical guidelines offered in this analysis are still applicable.

#### *Suggestions for future research*

The inclusion of ethnographic data was an invaluable source of information to this study and ought to be incorporated into future research. This is especially the case when dealing with individuals' subjective interpretations. In many instances, a formal questionnaire fails to fully tap residents' salient attitudes. Ethnographic methods, such as personal interviews and direct observation, allow for a more comprehensive assessment of individual attitudes and behaviors. Knowledge of ethnographic information also places individual responses within a larger physical and social context. Since this larger context shapes individual perceptions and attitudes, the more that is known, the more confident researchers can be in their interpretation of responses.

In addition to including ethnographic data, future studies specifically addressing quality of life issues need



to consider a series of questions that more fully address the saliency issues. For instance, in this study both health/safety and economic issues were found to be important areas of concern for local residents. Residents in communities distant from NTS have not had direct economic and employment benefits, but have had health/safety problems. If the proposed project were to be located nearer to their communities, and therefore offered more direct economic and employment benefits, would this attenuate their perceptions of harmful effects? In other words, future research ought to examine the priorities and threshold limits of various anticipated effects of proposed projects.

Although there are problems with analyses based on anticipated changes (e.g., asking respondents to look into the future and anticipate likely effects), such an approach can also be an asset for future researchers. For instance, the data in this study using residents' current and future perceptions and anticipated effects offer important baseline data. Within the social science literature there is a definite lack of longitudinal analyses. Therefore, subsequent research can examine residents' perceptions over time. As noted by Lounsbury et al. (1983:224):

As a project develops and progresses through the stages of initial planning, site selection, negotiation, construction, and operation, [and closure] there may be significant shifts in people's project-related beliefs and attitudes, particularly as they acquire new information

about the project and experience different aspects of its consequences.

The present data offer a sound base for such comparisons in any future research.

A final suggestion for further research is to go beyond the community-level analyses and examine the potential differential social impacts within various social categories. It is likely that individuals in different strata will vary in their responses to a project. For instance, it may be the case that retired persons differ in their perceptions from young adults. Therefore, the next step in the analyses of both the current data and new data ought to assess how different social categories within a community differ in their perceptions and anticipations of repository effects.

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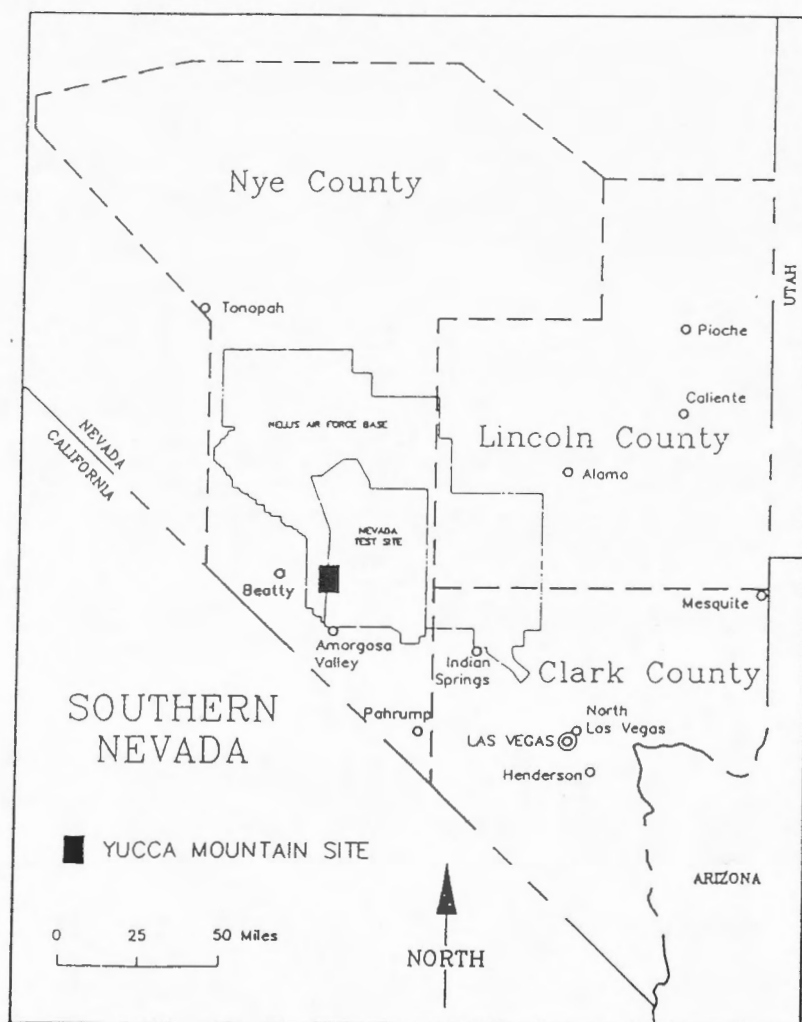
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## APPENDIX

2 2



## SOUTHERN NEVADA COMMUNITIES AND NUCLEAR WASTE



Rocky Mountain Social Science

Figure 2: Study Area

Please answer all questions in the order that they appear, without reading ahead. If you need more space to explain any of your answers, use the blank pages at the end of the questionnaire. If you are unable to answer a question, just write DON'T KNOW and go on to the next question.

### COMMUNITY TIES

Our first few questions deal with various kinds of relationships between people. Please read each question and provide your response by CIRCLING the appropriate number or letter, or by FILLING IN the blank.

1. Overall, about what percentage of the people in this community would you say that you know or at least recognize when you see them around town? Please PLACE AN X on the scale to indicate a number between 0% and 100% that best describes the percentage of people you know or recognize.

0%            25%            50%            75%            100%

|-----|

2. Of the 10 houses in this neighborhood that are closest to your home:
- a. How many of these houses have you been in? \_\_\_\_ (Please write the number.)
  - b. How many adults who live in these houses do you know on a first-name basis? \_\_\_\_ (Please write in the number.)
3. Besides those who live in your household, how many of your adult relatives or in-laws (children, parents, brothers/sisters, aunts/uncles, nieces/nephews, first cousins) live in this community? \_\_\_\_ (Please write in the number.)
4. How many of your adult relatives or in-laws live in other communities within about an hour's drive from here? \_\_\_\_ (Please write in the number.)
5. How many individuals do you consider to be really close friends of yours, that is, people you can confide in? \_\_\_\_ (Please write in the number.)
6. How many of these really close friends live in this community? \_\_\_\_ (Please write in the number.)
7. How many of these really close friends live in other communities within a one-hour drive from here? \_\_\_\_ (Please write in the number.)

8. The following are some organizations and activities often found in communities. If you belong to an organization or participate in an activity in this community, please put an X in the appropriate box. ALSO, check the second box if you are an official or formal leader of the group. (Please note that government organizations are listed in the next question.)

Organization or activity	Check here if you are a member or participant	Check here if you are a leader or officer
a. Rotary Club . . . . .	_____	_____
b. Lions Club . . . . .	_____	_____
c. Elks Lodge . . . . .	_____	_____
d. Moose Lodge . . . . .	_____	_____
e. Eastern Star/Rebekah . . . . .	_____	_____
f. I.O.O.F. (Odd Fellows) . . . . .	_____	_____
g. Masons . . . . .	_____	_____
h. Chamber of Commerce . . . . .	_____	_____
i. Business and Professional Women (BPW) . . . . .	_____	_____
j. Veterans of Foreign Wars (VFW) . . . . .	_____	_____
k. American Legion or Auxiliary . . . . .	_____	_____
l. Red Cross . . . . .	_____	_____
m. Volunteer fire dept. . . . .	_____	_____
n. Emergency response units such as volunteer ambulance, EMT, or search and rescue . . . . .	_____	_____
o. PTA . . . . .	_____	_____
p. Boy Scouts or Girl Scouts . . . . .	_____	_____
q. 4-H . . . . .	_____	_____
r. Farm or ranch organization . . . . .	_____	_____
s. An environmental group . . . . .	_____	_____
t. A labor union . . . . .	_____	_____
u. A sports team or league . . . . .	_____	_____
v. A local church congregation . . . . .	_____	_____
w. Senior citizens organization . . . . .	_____	_____
x. Theatre, drama or fine arts organization . . . . .	_____	_____
y. Other non-government groups (for example, riding, fishing or shooting club) Please list each group.		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

9. Please indicate whether you regularly attend meetings of any of the following organizations. Also indicate if you are an elected or appointed member.

	Check here if you regularly attend meetings	Check here if you are an elected or appointed member
a. County commission . . . . .	_____	_____
b. Town board/city council . . . . .	_____	_____
c. Parks and recreation committee . . . . .	_____	_____
d. Library board or committee . . . . .	_____	_____
e. Economic development committee . . . . .	_____	_____
f. Sewer and water board . . . . .	_____	_____
g. Planning board or committee . . . . .	_____	_____
h. Power association board . . . . .	_____	_____
i. Other community committees (please list)		
_____ . . . . .	_____	_____
_____ . . . . .	_____	_____

#### COMMUNITY AND PERSONAL SATISFACTION

The next several questions deal with how you feel about this community.

10. On a scale from 0 (COMPLETELY DISAGREE) to 10 (COMPLETELY AGREE), please indicate how you feel about each of the following statements (CIRCLE one answer for each statement).

	COMPLETELY DISAGREE																COMPLETELY AGREE
a. The longer I live in this town, the more I feel I belong here.	0	1	2	3	4	5	6	7	8	9	10						
b. The town in which I live is basically a friendly place.	0	1	2	3	4	5	6	7	8	9	10						
c. I feel fully accepted as a member of this community.	0	1	2	3	4	5	6	7	8	9	10						
d. If I was in trouble, many people in this community would go out of their way to help me.	0	1	2	3	4	5	6	7	8	9	10						
e. Most people in this community can be trusted.	0	1	2	3	4	5	6	7	8	9	10						

11. Using a scale from 0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED), how satisfied are you OVERALL with this community as a place to live?

COMPLETELY DISSATISFIED																	COMPLETELY SATISFIED
0	1	2	3	4	5	6	7	8	9	10							

12. Using the same scale from 0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED) how would you rate this community on each of the items listed below? CIRCLE a number between 0 and 10 that best indicates your opinion.

	COMPLETELY DISSATISFIED											COMPLETELY SATISFIED											Explain below if necessary																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
a. As a place to raise a family . . . . .	0	1	2	3	4	5	6	7	8	9	10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		



18. Now think about your life as a whole. On a scale from 0 (COMPLETELY DISSATISFIED) to 10 (COMPLETELY SATISFIED), overall how satisfied are you with your life these days?

COMPLETELY  
DISSATISFIED 0 1 2 3 4 5 6 7 8 9 10 COMPLETELY  
SATISFIED

19. Using the same scale, overall how satisfied are you with your economic situation these days?

COMPLETELY  
DISSATISFIED 0 1 2 3 4 5 6 7 8 9 10 COMPLETELY  
SATISFIED

20. Would you say you are financially better-off or worse-off now than you were 5 years ago?

- a. Much better off  
b. Somewhat better off  
c. About the same  
d. Somewhat worse off  
e. Much worse off

WHY? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

21. Do you expect that your financial position will be better or worse in 5 years than it is now?

- a. Much better  
b. Somewhat better  
c. About the same  
d. Somewhat worse  
e. Much worse

WHY? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

#### POLITICS AND GOVERNMENT

Now, we want you to think about some of the different ideas people have about government, and how you feel about these ideas. For each question, circle a number between 0 (NEVER) and 10 (ALWAYS) that corresponds to how you feel.

22. How often do you think you can trust the federal government in Washington to do what is right?

NEVER 0 1 2 3 4 5 6 7 8 9 10 ALWAYS

23. How often do you think you can trust the Nevada state government in Carson City to do what is right?

NEVER 0 1 2 3 4 5 6 7 8 9 10 ALWAYS



24. How often do you think you can trust the county commissioners and county government to do what is right?

NEVER 0 1 2 3 4 5 6 7 8 9 10 ALWAYS

25. How often do you think you can trust the city/town government in this community to do what is right?

NEVER 0 1 2 3 4 5 6 7 8 9 10 ALWAYS

26. In the last 4 years or so, have you done any of the following things? Please circle as many letters as apply to you.

- a. Written or talked to your Congressional representative, Senator, or any federal or state official to let them know what you would like them to do on a public issue?
- b. Written or talked to a county or local community official to let them know what you would like them to do on a public issue?
- c. Worked for the election of any political candidate by doing things like distributing circulars or leaflets, making speeches, or calling on voters?
- d. Worked for any group that was trying to change public policy or to pass or defeat a ballot measure?
- e. Contributed money to a political party, a candidate for a political office, or a group trying to help pass or defeat a ballot measure?

27. Did you vote in the 1986 general election when Nevada residents elected county commissioners, representatives to the State assembly and the governor?

- a. YES  
b. NO  
c. NOT ELIGIBLE (under 18; not in State)  
d. DON'T REMEMBER

## SCIENCE AND TECHNOLOGY

Now, let's move from your views on political issues to your views about science and scientists. Using a scale from 0 (STRONGLY DISAGREE) to 10 (STRONGLY AGREE), please indicate your opinion about each of the following statements by circling the appropriate number.

28. Scientists generally work for the well-being of the public.

STRONGLY DISAGREE 0 1 2 3 4 5 6 7 8 9 10 STRONGLY AGREE

29. Scientists often make sensational announcements just to get publicity.

STRONGLY DISAGREE											STRONGLY AGREE
0	1	2	3	4	5	6	7	8	9	10	

30. Science attempts to increase the knowledge we can apply to our everyday lives.

STRONGLY DISAGREE											STRONGLY AGREE
0	1	2	3	4	5	6	7	8	9	10	

31. Science creates more problems than it solves.

STRONGLY DISAGREE											STRONGLY AGREE
0	1	2	3	4	5	6	7	8	9	10	

32. Scientists can almost always be trusted when they say something like a product or procedure is safe.

STRONGLY DISAGREE											STRONGLY AGREE
0	1	2	3	4	5	6	7	8	9	10	

People often have different opinions about how safe or unsafe different kinds of facilities are. Thinking about your own health and safety, please tell me the FEWEST NUMBER OF MILES you would prefer to live from each of the following facilities (WRITE IN the number of miles).

33. A garbage dump (sanitary landfill)? \_\_\_\_ (NUMBER OF MILES)

34. A nuclear power plant? \_\_\_\_ (NUMBER OF MILES)

35. A plant that manufactures pesticides? \_\_\_\_ (NUMBER OF MILES)

36. An oil refinery? \_\_\_\_ (NUMBER OF MILES)

37. A landfill for disposing of chemical wastes? \_\_\_\_ (NUMBER OF MILES)

38. An underground storage facility for nuclear wastes? \_\_\_\_ (NUMBER OF MILES)

39. How likely do you think it is that above ground nuclear weapons testing activities at the Nevada Test Site have in the past caused harmful health problems for people who live in this area?

NOT AT ALL LIKELY											EXTREMELY LIKELY
0	1	2	3	4	5	6	7	8	9	10	

40. How likely do you think it is that underground nuclear weapons testing activities at the Nevada Test Site will in the future cause harmful health problems for people who live in this area?

NOT AT ALL  
LIKELY

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
LIKELY

41. To what extent do you agree with the following statement: "Experience at the Nevada Test Site has provided safe procedures for transporting and handling nuclear materials."

STRONGLY  
DISAGREE

0 1 2 3 4 5 6 7 8 9 10

STRONGLY  
AGREE

42. Generally speaking, would you say that the Nevada Test Site has had entirely harmful effects, that it has had entirely beneficial effects, or that beneficial and harmful effects balance each other?

ENTIRELY  
HARMFUL  
EFFECTS

0 1 2 3 4 5 6 7 8 9 10

BENEFITS  
AND HARMFUL  
EFFECTS EQUAL

ENTIRELY  
BENEFICIAL  
EFFECTS

NO  
EFFECTS  
X

43. Have you ever taken a tour of the facilities at the Nevada Test Site?  
a. YES  
b. NO

The next few questions deal with how people feel about the safety of using trucks or trains to carry hazardous materials such as dangerous chemicals, nuclear materials, and explosives. Please circle the number that best indicates your opinion about each of the following statements.

44. "Accidents involving the transportation of hazardous materials are inevitable."

STRONGLY  
DISAGREE

0 1 2 3 4 5 6 7 8 9 10

STRONGLY  
AGREE

45. "Hazardous materials should not be transported through highly populated areas."

STRONGLY  
DISAGREE

0 1 2 3 4 5 6 7 8 9 10

STRONGLY  
AGREE

46. "I have a hard time believing anyone who tries to tell me that transportation of hazardous materials is safe."

STRONGLY  
DISAGREE

0 1 2 3 4 5 6 7 8 9 10

STRONGLY  
AGREE

47. "From what I know, the current methods of transporting hazardous materials through my community are reasonably safe."

STRONGLY  
DISAGREE

STRONGLY  
AGREE

0 1 2 3 4 5 6 7 8 9 10

48. In the last year or so, have you heard that the federal government is thinking about building a repository to store highly radioactive wastes, such as those produced by nuclear power plants, at Yucca Mountain here in southern Nevada?

a. YES  
b. NO

49. Do you think that underground storage of high-level nuclear waste is the best means for disposing of it?

a. YES

b. NO →

How would you prefer  
to see it disposed of? \_\_\_\_\_

50. Do you think that a nuclear waste repository could be constructed and operated at Yucca Mountain in a way that would be acceptably safe?

a. YES  
b. NO

51. Do you think that nuclear wastes could be transported to the repository in a way that would be acceptably safe?

a. YES  
b. NO

52. How confident are you that federal agencies have provided the public with honest and accurate information about the safety of the government's nuclear programs?

NOT AT ALL  
CONFIDENT

EXTREMELY  
CONFIDENT

0 1 2 3 4 5 6 7 8 9 10

53. Generally speaking, do you think that the nuclear waste repository would have entirely harmful effects on this community, that the effects on the community would be entirely beneficial, or that beneficial and harmful effects would balance each other?

ENTIRELY  
HARMFUL  
EFFECTS

BENEFITS  
AND HARMFUL  
EFFECTS EQUAL

ENTIRELY  
BENEFICIAL  
EFFECTS

NO  
EFFECTS

0 1 2 3 4 5 6 7 8 9 10

X

WHY? \_\_\_\_\_

\_\_\_\_\_

54. Generally speaking, do you think that the nuclear waste repository would have entirely harmful effects on you personally, that the effects on you would be entirely beneficial, or that beneficial and harmful effects would balance each other?

ENTIRELY HARMFUL EFFECTS					BENEFITS AND HARMFUL EFFECTS EQUAL						ENTIRELY BENEFICIAL EFFECTS	NO EFFECTS
0	1	2	3	4	5	6	7	8	9	10		X

WHY? \_\_\_\_\_

\_\_\_\_\_

55. If the repository is built at Yucca Mountain, how concerned are you that it might have harmful effects on public health and safety in THIS AREA?

NOT AT ALL CONCERNED											EXTREMELY CONCERNED
0	1	2	3	4	5	6	7	8	9	10	

WHY? \_\_\_\_\_

\_\_\_\_\_

56. How concerned are you that nuclear radiation would not be confined to the repository and might contaminate underground water supplies?

NOT AT ALL CONCERNED											EXTREMELY CONCERNED
0	1	2	3	4	5	6	7	8	9	10	

WHY? \_\_\_\_\_

\_\_\_\_\_

57. How do you think the repository would affect the economic well-being of residents or businesses in this area?

ENTIRELY HARMFUL EFFECTS					BENEFITS AND HARMFUL EFFECTS EQUAL						ENTIRELY BENEFICIAL EFFECTS	NO EFFECTS
0	1	2	3	4	5	6	7	8	9	10		X

WHY? \_\_\_\_\_

\_\_\_\_\_

58. Thinking about everything that has occurred over the past year or so, how fair do you think the process of selecting Yucca Mountain as a possible site for a nuclear waste repository has been?

COMPLETELY  
UNFAIR

0 1 2 3 4 5 6 7 8 9 10

COMPLETELY  
FAIR

WHY? \_\_\_\_\_

59. If you were able to make the final decision regarding the location of the nuclear waste repository at Yucca Mountain, would you build it there?

- a. DEFINITELY YES  
b. PROBABLY YES  
c. UNCERTAIN  
d. PROBABLY NO  
e. DEFINITELY NO

WHY? \_\_\_\_\_

\*PLEASE READ THE FOLLOWING BEFORE GOING ON TO THE NEXT SET OF QUESTIONS\*

Imagine that the federal government has already built a nuclear waste repository at Yucca Mountain, 95 miles northwest of Las Vegas (see map on cover of questionnaire). The repository site covers about 24,000 acres. It contains several buildings above ground where wastes are received and repackaged and has tunnels and storage areas 1,500 feet underground for storing wastes.

During the thirty years the repository will be open, over 70,000 shipments by truck and 9,000 shipments by rail will arrive at Yucca Mountain. Each day the repository will receive 4 shipments by truck and 2 by rail. When the shipments arrive at the site, workers will unload the wastes from the 40-ton casks and repackage them in smaller canisters that will be stored below ground. While in operation the repository will employ 3,500 people. Activities at the repository will generate significant tax revenues, at least \$100 million each year.

Before the repository opens, the highways and railroad tracks into Yucca Mountain will be improved. People will be specially trained to escort each shipment to the site. The shipment routes will be selected and emergency response plans developed jointly by local, state and federal agencies. Despite safety precautions, about once every 3 years a truck carrying nuclear waste will be involved in a transportation accident.

Imagine that a truck carrying nuclear waste to Yucca Mountain has an accident very near to your community, and the 40-ton cask becomes separated from the truck. This accident ties up traffic and causes extensive detours around the area. Because radioactive materials are involved, emergency teams are sent to determine whether radiation is leaking. However, delays in telling the public whether or not there is danger from radiation causes some people to become concerned about their health and safety and leave the area. After several hours, it is determined that no radiation was released. However, some people are still afraid to return to their homes and work places, since the news media continues to carry reports on the accident that raise questions about the safety of nuclear waste transportation. Also, traffic will continue to be detoured around the accident site for several days while special equipment is brought in to get the truck and cask moving again.

ALTHOUGH SOME OF THE QUESTIONS WHICH FOLLOW ARE SIMILAR TO THOSE PREVIOUSLY ASKED, PLEASE ANSWER QUESTIONS 60 THROUGH 72 WITH THE ABOVE DESCRIPTION OF EVENTS IN MIND.

60. Compared to your expectations about the nuclear waste program, are the hypothetical events described above more or less threatening to public safety?

EVENTS DESCRIBED  
LESS THREATENING

0 1 2 3 4 5 6 7 8 9 10

EVENTS DESCRIBED  
MORE THREATENING

61. Given the events described above, how concerned would you be about the overall safety of the nuclear waste program?

NOT AT ALL  
CONCERNED

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
CONCERNED

WHY?

62. How concerned would you be that the nuclear waste program might threaten public safety in this community?

NOT AT ALL  
CONCERNED

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
CONCERNED

WHY?

63. If these events occurred, how confident are you that government agencies would be able to respond to any problems and go on in the future to manage the nuclear waste program in a safe way?

NOT AT ALL  
CONFIDENT

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
CONFIDENT

64. How confident are you that government agencies would provide the public with complete and accurate information about problems with the nuclear waste program if they occurred?

NOT AT ALL  
CONFIDENT

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
CONFIDENT

65. If these events occurred, how likely do you think it is that health and safety problems could arise for people living in this area?

NOT AT ALL  
LIKELY

0 1 2 3 4 5 6 7 8 9 10

EXTREMELY  
LIKELY



66. If the events described above were to occur, how do you think economic opportunities in this community would be affected?

ENTIRELY HARMFUL EFFECTS						BENEFITS AND HARMFUL EFFECTS EQUAL						ENTIRELY BENEFICIAL EFFECTS	NO EFFECTS
	0	1	2	3	4	5	6	7	8	9	10		X

67. How likely is it that you would move out of this community if the types of events just described were to happen?

a. Definitely would NOT move      WHY? \_\_\_\_\_  
 b. Probably would NOT move  
 c. Probably WOULD move  
 d. Definitely WOULD move

68. If you answered a or b on the last question, go to question 69.  
 If you circled c or d, WHERE would you consider moving?

a. To another location in this community  
 b. Out of this community, but would stay in southern Nevada  
 c. Out of southern Nevada, but would remain in Nevada  
 d. Out of Nevada entirely  
 e. Would move, but don't know where

69. If these events occurred, how likely is it that you would make any new economic investments in this community, such as buying another home, buying property, or investing in a local business if you had the money to do so?

a. Definitely would invest      WHY? \_\_\_\_\_  
 b. Probably would invest  
 c. Probably would not invest  
 d. Definitely would not invest

70. If the events we have described happened, would you be concerned enough to do any of the following things? Circle as many of the following as you think you would probably do.

a. Contact a congressional representative, senator, or state official to express your concerns about the repository program  
 b. Contact a county or local official to express your concerns about the repository program  
 c. Attend a community meeting organized to discuss the safety of the repository program  
 d. Help circulate a petition to improve the safety of the repository  
 e. Work for a group or organization that wants to improve the safety of the repository program  
 f. Contribute money to an organization that wants to improve the safety of the repository program  
 g. Vote for a political candidate who promised to close the repository  
 h. Participate in a demonstration to close the repository  
 i. Something else (please explain) \_\_\_\_\_

71. Overall, if the events we have described were to occur, how satisfied would you be with this community as a place to live?

COMPLETELY  
DISSATISFIED      0   1   2   3   4   5   6   7   8   9   10      COMPLETELY  
SATISFIED

72. Given the potential for events like those described above, if you were able to make the final decision regarding the location of the nuclear waste repository at Yucca Mountain, would you build it there?

- a. DEFINITELY YES  
b. PROBABLY YES  
c. UNCERTAIN  
d. PROBABLY NO  
e. DEFINITELY NO

WHY? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### BACKGROUND QUESTIONS

Finally, we would like to ask a few questions about you, your background and your past experiences. This information will be used for statistical analysis only. Please keep in mind that all information is strictly confidential, and that your anonymity is assured.

73. How long have you lived in this community? \_\_\_\_ years (if less than 1 year indicate months \_\_\_\_)
74. How long have you lived in this county? \_\_\_\_ years (if less than 1 year indicate months \_\_\_\_)
75. How long have you lived in Nevada? \_\_\_\_ years (if less than 1 year indicate months \_\_\_\_)
76. What is the total number of communities you have lived in during the past 5 years? \_\_\_\_ (write in the number)
77. Did you live in an area which received radioactive fallout during the period when above ground nuclear weapons tests were being conducted at the Nevada Test Site?  
a. YES  
b. NO
78. What is your current marital status?  
a. Married  
b. Not married, but living with a partner  
c. Never married  
d. Separated  
e. Divorced  
f. Widowed

79. Which of the following best describes your religious preference?

- a. Protestant
- b. Catholic
- c. LDS (Mormon)
- d. Jewish
- e. Other (please specify \_\_\_\_\_)
- f. None

80. What is your racial or ethnic background?

- a. Anglo or white/caucasian
- b. Hispanic/Mexican/Chicano
- c. American Indian
- d. Black
- e. Oriental/Asian
- f. Other (please specify \_\_\_\_\_)

81. How many living children do you have? \_\_\_\_ (write in the number)

82. Starting with you, please list everyone who lives in your household, indicating each person's RELATIONSHIP TO YOU, SEX AND AGE. (Please list household members as spouse, parent, child, boarder, etc. Please do not list by name).

RELATIONSHIP OF  
HOUSEHOLD MEMBERS

SEX

AGE

Self _____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____
_____	M	F	_____

83. What is the highest level of education you have completed? (Circle one.)

- a. Never attended school
- b. Grade school (grades 1 through 8)
- c. Some high school (grades 9 through 12)
- d. Completed high school
- e. Completed a post-high school trade school program
- f. Some college
- g. Completed bachelors degree in college
- h. Some graduate work at a university
- i. Completed a graduate degree (Masters or Ph.D.)

84. Which of the following best describes your current dwelling? (Circle one.)

- a. single family house
- b. mobile home or trailer
- c. townhouse or duplex
- d. apartment
- e. motel or boarding room
- f. Other (please specify \_\_\_\_\_)

85. Which of the following describes your housing situation? (Please circle one.)
- a. own home outright
  - b. buying home (mortgage or contract)
  - c. leasing by the year
  - d. renting by the week or month
  - e. Other (please specify \_\_\_\_\_)
86. What is your current paid employment status?
- a. Working full-time
  - b. Working part-time
  - c. Never been employed
  - d. Currently unemployed
  - e. Retired
  - f. Something else (Please explain \_\_\_\_\_)
87. Please describe your main occupation, that is, the kind of work you do (if not presently employed, describe your previous occupation).
- \_\_\_\_\_
88. What are/were your most important job duties or activities?
- \_\_\_\_\_
89. What kind of business, industry, or organization do/did you work for?
- \_\_\_\_\_
90. Do/did you supervise the work of others as part of your job?
- a. YES
  - b. NO
91. Are you a member of a labor union or similar employees' association?
- a. YES → Please name \_\_\_\_\_
  - b. NO
92. Do you expect to quit your present job in the next 5 years or so?  
(Go to question 93 if retired or not employed at a paid job.)
- a. Definitely will not quit
  - b. Probably will not quit
  - c. Probably will quit
  - d. Definitely will quit → WHY do you think that you will quit your job? \_\_\_\_\_
  - e. Don't know
93. Have you ever worked at any job that involved being in an area or a facility where radioactive materials were handled by others, but not by you?
- a. YES
  - b. NO
94. Have you ever worked at any job that required you to work directly with radioactive materials as part of your job?
- a. YES
  - b. NO

95. Have you ever worked for the federal government or a government contractor at any of the following areas? Place an X in the appropriate space for each item.

	Working there now	Worked there previously	Never worked there
a. Nevada Test Site (NTS)	_____	_____	_____
b. Tonopah Test Range (TTR)	_____	_____	_____
c. Nellis AFB	_____	_____	_____
d. Indian Springs AFB	_____	_____	_____

96. Is any member of your immediate family (parent, brother, sister, spouse or child) currently working for the federal government or a government contractor at any of the following areas? (Circle a letter for each that applies.)

- a. Nevada Test Site (NTS)
- b. Tonopah Test Range (TTR)
- c. Nellis AFB
- d. Indian Springs AFB
- e. No family member works at any of these places

97. Has any member of your immediate family (parent, brother, sister, spouse or child) ever worked for the federal government or a government contractor at any of the following areas? (Circle a letter for each that applies.)

- a. Nevada Test Site (NTS)
- b. Tonopah Test Range (TTR)
- c. Nellis AFB
- d. Indian Springs AFB
- e. No family member has ever worked at any of these places

98. Finally, please circle the letter that best describes your total HOUSEHOLD INCOME from all sources before taxes in 1987.

- a. under \$5,000
- b. \$5,000 to \$9,999
- c. \$10,000 to \$19,999
- d. \$20,000 to \$29,999
- e. \$30,000 to \$39,999
- f. \$40,000 to \$49,999
- g. \$50,000 to \$59,999
- h. \$60,000 to \$69,999
- i. \$70,000 or more

THANK YOU for your cooperation. Please feel free to use any available space in this questionnaire or in a separate letter to tell us any additional information you would like to share.

## VITA

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